

Institute for Logic, Language and Computation University of Amsterdam

Self-Evaluation Report 2018–2023

We are proud to present the self-evaluation report of the *Institute for Logic, Language and Computation* (ILLC) of the University of Amsterdam over the years 2018–2023. The report is provided by the ILLC Management Team and organised as outlined in the Strategy Evaluation Protocol 2021–2027 published by the Association of Universities (‘Universiteiten van Nederland’), the Royal Netherlands Academy of Arts and Sciences (KNAW), and the Dutch Research Council (NWO). The digital version of this document contains hyperlinks.

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1 Introduction

The ILLC, being part of the Faculty of Science (FNWI) and the Faculty of Humanities (FGw), is home to a thriving community of philosophers, computer scientists, logicians, mathematicians, musicologists, linguists, and cognitive scientists who share a deep passion for the use of formal and computational methods in the interdisciplinary study of information. Building on Amsterdam's strong tradition in logic and foundational research, and combining techniques from the humanities and the exact sciences, researchers at the ILLC have succeeded in creating a unique oasis for interdisciplinary studies in logic, language and computation which attracts visiting international scholars and students from all over the world.

1.1 Short historical background of ILLC and its interdisciplinary nature

The ILLC stands in a long tradition of logic in Amsterdam, pursued in a broad sense. In the 1950s, the philosopher and logician E.W. Beth founded the Institute for Logic and Philosophy of the Exact Sciences which brought together mathematicians and philosophers, and which also initiated a first outreach toward linguistics and the then nascent computer science. After some reorganisations, it resulted in 1991 as the interfaculty Institute for Logic, Language and Computation (ILLC) shared between the Faculty of Science (FNWI) and the Faculty of Humanities (FGw). The ILLC is home to research lines such as the Amsterdam tradition in modal and intuitionistic logic, and dynamic and inquisitive semantics of natural language, which have fed into subsequent research on logics of information dynamics and agency. These themes connect mathematics, philosophy and linguistics in various meaningful ways that keep evolving. In addition, computational complexity in various forms is a long-standing theme, which lead, among others, to an impactful new research line on quantum computation. Other lines have kept emerging as well since the institute was founded. The ILLC has a long tradition in artificial intelligence, in particular in computational linguistics and computational musicology. This started with the paradigm of data-oriented parsing and evolved into the current focus on machine learning and generative AI, with applications from language to music leading to new mixtures of logic, probability and computation. Outreach to social sciences is a new trend, witness new research programmes in computational social choice and computational social science. Finally, the ILLC is pursuing contacts with cognitive science. During the evaluation period it was an active participant in the Amsterdam Center for Brain and Cognition and the national gravitation project Language in Interaction. In 1995, a [Master Programme in Logic](#) was established, the first such international programme at the University of Amsterdam. In addition to this successful master programme the ILLC also organises its own [PhD programme](#) which is recognised by both faculties. For a more extensive overview of its history, see J. van Benthem and M. Stokhof's [A Brief History of the Institute for Logic, Language and Computation: People, Ideas and Practices](#), published in 2021.

Interdisciplinarity is at the heart of what the ILLC is about and the balance between the academic cultures of the two involved faculties is of crucial importance. This is the case in the areas of Logic, of Language, and of Computation. On *Logic*, the ILLC exhibits a unique combination of technical expertise typical of the sciences, with insights from philosophical foundations and the use of logic for the analysis of meaning, more typical for the humanities. On *Language*, it combines, e.g., knowledge of how to engineer large language models, as done typically within a science faculty, and of how to exploit these models in order to better understand how *humans* learn and use language. On *Computation*, the ILLC not only works on developing techniques to measure the computational complexity of algorithms, but also uses computational tools to understand what makes music tunes catchy; and it not only develops software for quantum computers, but also looks into the societal impact quantum computers would give rise to. In general, recent years have seen an unprecedented increase in the importance of research in and about artificial intelligence (AI): the ILLC community is convinced that this development will require a close collaboration between the humanities and the sciences and that ILLC is uniquely positioned to play an important role as an interdisciplinary link. E.g., understanding how one can use technology to advance democratic values and equality is just one other example of a study that requires the holistic view of the humanities as well as the problem-solving skills of the sciences. The ILLC is uniquely positioned to play an important role in providing answers to such questions, which will involve discussions of the broader world of public communication, societal debate, and science policy. The researchers at the ILLC are keen to play their part in these discussions.

The inter-faculty nature of the ILLC means that it is closely linked with research institutes and teaching

ROLE		UNTIL AUGUST 2021	SINCE SEPTEMBER 2021
Scientific Director		Professor Sonja Smets	Professor Robert van Rooij
Institute Manager		Jenny Batson	Peter van Ormondt (from December 2021)
Vice Director Research		—	Professor Benedikt Löwe (until January 2023) Professor Raquel Fernández (from January 2023) Professor Khalil Sima'an
Vice Director Teaching		—	
Director Doctoral Programme		Dr Floris Roelofsen	Dr Floris Roelofsen (until December 2021) Dr Maria Aloni (from January 2022)
Director Master of Logic		Dr Maria Aloni	Dr <i>Paul Dekker</i> (until September 2023) Dr <i>Nick Bezhanishvili</i> (from September 2023)
MCL	Leader	—	Professor <i>Yde Venema</i>
	Deputy	—	Dr Benno van den Berg
TCS	Leader	—	Professor <i>Ulle Endriss</i>
	Deputy	—	Dr Ronald de Haan
FSPL	Leader	—	Dr <i>Luca Incurvati</i>
	Deputy	—	Dr Maria Aloni
EPS	Leader	—	Dr <i>Dingmar van Eck</i>
	Deputy	—	Professor Arianna Betti
NLP&DH	Leader	—	Dr <i>Ekaterina Shutova</i>
	Deputy	—	Dr Jelle Zuidema
LMC	Leader	—	Dr <i>Ashley Burgoyne</i>
	Deputy	—	Dr Katrin Schulz
LoCo	Leader	Professor Yde Venema	—
	Deputy	Professor Benedikt Löwe	—
LoLa	Leader	Professor Robert van Rooij	—
	Deputy	Dr Paul Dekker	—
LaCo	Leader	Professor Khalil Sima'an	—
	Deputy	Dr Jelle Zuidema	—

Table 1: ILLC staff members involved in the institute’s management structure before and after the changes; members of the old Management Team and the new Management Team Small (**MTK**) are listed in boldface; additional members of the new Management Team Large (*MTG*) are listed in italics.

activities in both faculties such as the *Korteweg-de Vries Institute for Mathematics* (KdVI), the *Institute of Informatics* (IvI), *Institute for Physics* (IoP), the *Amsterdam Center for Language and Communication* (ACLC) and the various departments of the Faculty of Humanities that house ILLC members (see below).

1.2 ILLC organisation and management structure

The ILLC is part of the Faculty of Science (FNWI) and the Faculty of Humanities (FGw). Each ILLC member is employed by one of these faculties, and PhDs follow the rules of both. While the former faculty is the administrative host of the institute, the ILLC reports to both deans and participates in meetings, decision-making processes, and teaching activities within both faculties. The close collaboration between these two faculties—in the context of an inter-faculty covenant that describes their respective role and duties—is central for the success and prosperity of the ILLC. The institute’s research programme, for instance, is approved by the deans of both participating faculties, and to ensure the coherence of our interdisciplinary institute each ILLC member employed by FGw is guaranteed a (primary or secondary) working space at FNWI.

Due to the special administrative status of the ILLC, the day-to-day running of the institute itself is more complex, and more time-consuming than that of other research institutes, since consultations with two different faculty administrations and several separate departments have to be conducted. What complicates the matter further is that the administrative structure of the faculties involved differs considerably. In the Faculty of Science the research institutes are the primary units in the organisation, both with regard to budgetary and personnel matters. In the Faculty of the Humanities the departments are the primary organizational units, hosting the academic staff.¹ The research and teaching activities conducted by the staff is organised in institutes. The [Amsterdam Institute for Humanities Research](#) (AIHR) is the faculty’s unit for research. The institute contains

¹ILLC members at the Faculty of Humanities are housed in six different departments: the *Departments of Philosophy, Literary Studies and Linguistics, Arts and Culture, Modern Foreign Languages and Cultures, Media Studies and Dutch Studies*.

six interdisciplinary research schools, among which the ILLC. The research schools at the Faculty of Humanities have no primary role in budgetary or personnel decisions, but function as responsible stakeholders for quality and strategy of research.

The ILLC management is responsible for the governance of the institute. The management and organisational structure of the institute has undergone some changes within the period under evaluation, partially triggered by the recommendations of the previous evaluation committee. This committee recommended that the ILLC should re-evaluate the adequacy of the labels of its research units so as to reflect better the changing profiles of the staff in the programmes. The ILLC decided on a more radical change in the organisation of its research (compared to just changing labels), with the idea that the new research units would become more coherent and recognisable to the outside world. The ILLC modified its management structure as well, partly because of this change in organisational structure, and partly because of the growth of the institute.

Old structure. Until August 2021, the ILLC Management Team consisted of the scientific director, the institute manager, the director of the ILLC Doctoral Programme, the director of the Master of Logic, and the three unit leaders of the research programmes that traditionally have organised our research, namely, *Logic & Computation* (LoCo), *Logic & Language* (LoLa), and *Language & Computation* (LaCo).

New structure. Since 1 September 2021, the ILLC has the following more coherent and recognisable six research units, a brief description of which can be found in Appendix 11.2:

- *Mathematical & Computational Logic* (MCL)
- *Theoretical Computer Science* (TCS)
- *Formal Semantics & Philosophical Logic* (FSPL)
- *Epistemology & Philosophy of Science* (EPS)
- *Natural Language Processing & Digital Humanities* (NLP&DH)
- *Language & Music Cognition* (LMC)

In the new management structure, the Management Team includes two tiers:

MTK. The *Management Team Small* consists of the scientific director, the institute manager, the director of the ILLC Doctoral Programme in Logic and two vice directors. According to the governance model of the University of Amsterdam, the scientific director takes responsibility for the institute, supported by the two vice directors. One vice director supports the director in coordinating the teaching activities of the ILLC members at the FNWI (where the ILLC is involved in nine different education programmes), while the other supports them on ILLC’s research activities. The members of the MTK meet biweekly to discuss and make decisions on all matters of importance to the institute.

MTG. The *Management Team Large* consists of the members of the MTK together with the leaders of the six research units and the director of the Master of Logic. The members of the MTG meet bimonthly to discuss possible issues brought up by ILLC staff members through the unit leaders and all major strategic decisions to be taken at the institute.

The unit leaders participate in the meetings of the MTG and serve as liaison between the senior staff members of the ILLC and the management structure. They organise regular meetings of their units and are in charge of the travel and colloquium budget of the units. Concerning its general policy, quality control and scientific developments, the ILLC is advised by an external [Scientific Advisory Board](#) (‘Wetenschappelijke Adviesraad’), consisting of five highly esteemed international members of the research community. An overview of the ILLC staff members involved in the institute’s old and new management structure is provided in Table 1.

What has not changed in the management structure is the role and embedding of the support staff unit: the *ILLC Office*. Members of the ILLC Office are employed at the Faculty of Science but the ILLC Office supports the ILLC members of both faculties. Especially, the ILLC members employed by the Humanities who have their primary office at Science Park rely as much on the ILLC Office as the colleagues who are employed by the Faculty of Science.

2 Mission of the last six years

The scientific mission of the Institute for Logic, Language and Computation (ILLC) has been to study formal properties of information, viz. the logical structure and algorithmic properties of processes of encoding, transmitting and comprehending information. Information here is to be viewed in its broadest sense, from the flow of information in natural and formal languages to the information contained in music and graphics. The research aim is to develop formal systems that can handle this rich variety of information, making use of insights across disciplines such as linguistics, computer science, cognitive science, artificial intelligence and philosophy.

In addition to its specific research goals, the ILLC aims to overcome traditional boundaries between faculties and disciplines and serves as a rallying point for information scientists across computer science, linguistics and computational linguistics, philosophy, musicology, and the social sciences. Interdisciplinary research is indeed at the heart of what the ILLC is about: The institute sees it as its task to foster interdisciplinary work that crosses the boundaries between its main research lines. This vision holds beyond research. The ILLC is keen to maintain a strong presence in all the departments and faculties where it participates, also through teaching and involvement in other activities and decision-making processes. The institute aims to contribute to a better mutual understanding between disciplines, and regards the balance between the two involved academic cultures and their institutions in science and the humanities as a matter of crucial importance.

At the ILLC, research and higher education are inseparable. The ILLC researchers believe in the Humboldtian ideal of unity of research and education. The graduate programmes of the ILLC, both at the Master's (in particular the Master of Logic—see Section 10.1—and the Master of AI) and the Doctoral level (see Section 6.4 on our PhD programme) are intimately integrated into the research vision of the institute and researchers collaborate with our postgraduate students intensively.

The ILLC aims to be a place where different forms of talent and commitment are recognised, developed and rewarded. Our mission is to provide a safe and healthy work climate, where existing talent can flourish, via personal development, and feel connected. We are convinced that diversity stimulates the academic culture and well-being at the institute, and also improves research quality.

3 Strategic goals of the last six years

The ILLC is a renowned centre in interdisciplinary research. It is thriving, continuously innovating its research agenda without compromising its identity. As a consequence, the research portfolio of the institute is a blend of traditional areas of historical importance (such as modal logic, mathematical logic, and formal semantics) and newer trends (such as models of cognition and machine learning methods in AI). The main research strategy of the ILLC during the last six years has been to stay close to the dual approach of tradition and innovation: maintaining excellence in those areas for which the ILLC has built a reputation over decades, while also exploring new avenues of research that complement the traditional areas, including AI and its societal impact. Because of the intimate connection between our research and teaching activities, this dual approach manifests itself in the education programmes in which the ILLC is involved at the graduate level, too.

The ILLC was formally evaluated by an evaluation committee in December 2018. The evaluation committee highlighted our strengths and excellence in research and stressed that the ‘enormous variety of work is breathtaking’.² The evaluation committee still proposed a number of recommendations to the ILLC. The strategic goals of the last six years have largely been shaped by these recommendations.

- R1: The ILLC’s research programmes should re-evaluate the adequacy of their labels.
- R2: A wider variety of measures should be used to attract and retain female faculty.
- R3: The institute should consider how it might engage societal partners less modestly.
- R4: The institute should track its products for peers, especially data sets and software.
- R5: The organisational situation in the Faculty of Humanities warrants careful monitoring.

The three main pillars on which ILLC’s research rests are naturally *logic*, *language*, and *computation*. Previously, the institute had organised itself in terms of 3 ‘programmes’ that highlighted its research at the main intersections of these 3 pillars: *Logic & Computation*, *Logic & Language*, and *Language & Computation*. However, due to the growth of the institute, these labels did no longer capture the variety of research topics pursued within the ILLC. Hence, a major strategic goal has been to take up the challenge to reorganise the institute’s structure (G1). Our aim was to find a better way to capture the profile of our staff members and to make the research that is carried out at the ILLC more transparent to the outside world. Furthermore, we wanted to enhance and better highlight cross-disciplinary links within the institute, striving towards a better balance across the three pillars of ILLC’s research—logic, language, and computation—within the two faculties, Science and Humanities (G2).

Two additional goals were key to the institute’s strategy in the last six years: First, we aimed to implement measures to enhance diversity and attract and retain female staff members (G3), especially at the Faculty of Science. Second, we endeavoured to strengthen our societal relevance by designing a new strategy for a stronger engagement with local, academic, industrial, and societal partners (G4). We envisioned that the moves to the new buildings (or Labs) at the faculties of Science and Humanities would improve collaboration with local partners. This, together with a sometimes more practical orientation of our research, should contribute to enhance our knowledge utilisation activities and provide further opportunities to secure research funding. Keeping track of the institute’s products beyond publications is an integral part of this goal.

Finally, we aimed to protect ILLC’s position in the Faculty of Humanities, thereby maintaining a strong presence within both faculties (G5).

²Research Review, *Institute for Language, Logic and Computation* (sic!), University of Amsterdam, 2012–2017, p. 7.

4 Reflection on realisation of mission and goals of the last six years

4.1 New organisational structure (addressing G1 and R1)

Research units and interdisciplinary links. The institute engaged in an intensive bottom-up process to implement the recommendation to re-evaluate its research labels. First, based on the profiles of the ILLC researchers, descriptions of six research areas were created; all senior members of the ILLC were asked to identify their primary and possibly one or more secondary affiliations to these areas. After that, the senior members with the same primary affiliation discussed the precise scope, the name, and the leadership of each of these areas. This process resulted in the **six research units** listed in Section 1.2 (see Section 11.2 in the Appendix for a description of each unit). Figure 1 illustrates how the new units relate to the three ILLC pillars of *logic*, *language* and *computation*.

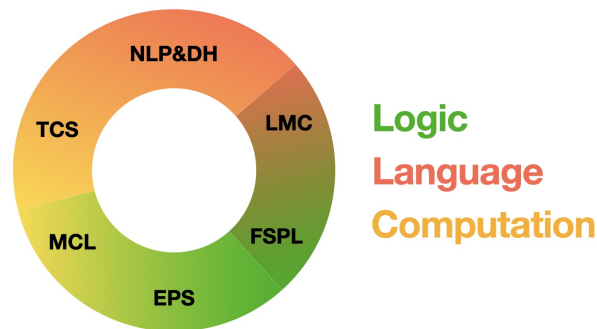


Figure 1: Schematic visualisation of how the six new research units relate to the three ILLC pillars.

As part of a reflection on how to best exploit ILLC’s interdisciplinarity, at the start of the period under evaluation we had identified a number of themes that cut across the then existing research programmes: LoLa, LoCo, and LaCo (see Section 7.2 of the previous self-evaluation report). The new research organisation ended up subsuming these themes, thereby facilitating interdisciplinary links in different ways. Some units, such as NLP&DH and LMC, are inherently interdisciplinary while other units are interconnected by common themes—for example, explainable and ethical AI is a prominent cross-disciplinary theme being pursued in TCS, NLP&DH, EPS and LMC. Moreover, researchers from different units often co-author publications (cf. Appendix 11.5.5, Table 25) and collaborate through joint supervision of PhD students and co-participation in research grants (cf. Appendix 11.8, Table 32). In addition, several seminar series cross the boundaries of different research units. For example, the *Logic and Interactive Rationality (LIRa)* seminar is jointly organised by the TCS, EPS and MCL units; the *Discourse in Philosophy (DIP) Colloquium* is organised by FSPL but involves members of LMC and EPS as well; and the *Computational Linguistic Seminar* attracts participants from NLP&DH and LMC.

Management structure. Besides restructuring its research labels, the institute also reorganised some aspects of its management structure. This was mainly motivated by the growth of the institute. The change coincided with (1) Robert van Rooij succeeding Sonja Smets as director of ILLC and (2) the retirement of the institute manager Jenny Batson; her successor is Peter van Ormondt, who has many years of experience in the ILLC Office. In the new management structure, the scientific director is supported in his or her duties by two vice directors that are in charge of coordinating research and teaching, respectively. The Vice Director for Research informs the unit leaders about funding opportunities and, together with the institute manager, has an overview of all staff members and their eligibility for available grants. The Vice Director for Teaching oversees the various educational activities that the staff members of the ILLC perform for undergraduate and postgraduate programmes at the UvA, in particular at the Faculty of Science.

Each research unit has a unit leader and a deputy. The unit leaders participate in bimonthly Management Team Large meetings and serve as liaison between the senior staff members of the ILLC and the management structure. They organise regular meetings within their units and are in charge of the travel and colloquium

budget of the units. The holders of the different management positions in the old and the new structure are listed in Section 1, Table 1.

Overall, the new organisational structure has been beneficial on two key fronts: On the one hand, we have transitioned to a more appropriate way of describing and organising the research carried out at the institute, by adopting labels that better reflect the scope of our research and that are more transparent to the outside world. On the other hand, with the new management structure, we have achieved better representation of staff members within the Management Team and more participatory decision-making processes within the institute.

4.2 Balance growth within the faculties (addressing G2)

During the period under evaluation, we were able to install a new balance between our involvement in the Faculty of Science and the Faculty of Humanities, strengthening both sides while allowing for a more substantial expansion on the Humanities side, where growth had been more limited in the past.³

Over 2018–2023, the ILLC hired 10 permanent staff members at the Faculty of Science (and 4 left).⁴ and gained 16 new staff members at the Faculty of Humanities (and 4 left).⁵ Growth took place within the three pillars of the institute. Both the technical and philosophical sides of **logic** grew, with 2 positions at Science⁶ and 4 at Humanities.⁷ The **language** component of the institute saw an explosive growth, with 6 positions in natural language processing spanning both faculties,⁸ as well as several new positions at Humanities in the semantics of natural language that are tied to cognitive science. The later development also made it possible to give a new impulse to music cognition.⁹ The **computation** component was also able to grow substantially, not only thanks to new positions on natural language processing, but also due to, on the one hand, the institute’s targeted investments in theoretical computer science within the Faculty of Science (4 new positions)¹⁰ and, on the other hand, new opportunities that arose in the area of digital humanities and computational social science within the Faculty of Humanities (7 new positions).¹¹

The ILLC has played a central role in the development of Quantum Computing as a scientific discipline and the proliferation of Amsterdam as a major hub in this area. This is true, specifically, for the assessment period of 2018–2023, which saw the accelerated growth of QuSoft, the Dutch Research Center for Quantum Software, a collaboration between CWI and the University of Amsterdam. Its first director, Harry Buhrman, obtained his PhD from the ILLC and is still affiliated with the institute, while its current director, Christian Schaffner, grew at the ILLC from Postdoc to Associate Professor, before taking up the Chair in Theoretical Computer Science at the neighbouring Informatics Institute. A recent highlight in the area of Quantum Computing has been the NWO Vidi grant awarded to Maris Ozols in 2019 for research on quantum algorithms. Besides the algorithmic and information-theoretic focus of research related to Quantum Computation taking place at the ILLC, the institute has continued to contribute to logical approaches in this domain, led by Sonja Smets. In addition, by hiring Sebastian de Haro through a joint appointment with the Institute of Physics, we have made the conscious decision to also invest into research capacity regarding the societal impacts of Quantum Computing.

4.3 Enhancing diversity (addressing G3 and R2)

Gender balance is a perennially difficult issue for the ILLC since several of our core disciplines, especially at the Faculty of Science, have notoriously low representation of female researchers. In line with the recommendations

³This is due to multiple reasons, most prominently (i) the increasing number of students in the education programmes on Artificial Intelligence and Computer Science at the Faculty of Science; (ii) the improved financial situation of the Faculty of Humanities due to the growth of its student population; and (iii) the national ‘sectorplan’ for Social Sciences and Humanities (SSH) which had *Humane AI* as one of its focal points which is directly connected with research avenues central to the ILLC.

⁴Bahareh Afshari, Benedikt Löwe, Christian Schaffner (all improved positions elsewhere), Leen Torenvliet (retirement).

⁵Francesco Berto, Federica Russo, Jakub Szymanik (all improved positions elsewhere), Michiel van Lambalgen (retirement).

⁶Erman Acar (UD), Franziska Jahnke (UHD).

⁷Aybüke Özgün (UD), Giorgio Sbardolini (UD), Thomas Schindler (UD) and Tom Schoonen (UD).

⁸at FNWI: Wilker Aziz (UD), Sandro Pezzelle (UD), James Trujillo (UD), at FGw: Raquel Alhama (UD), Jelke Bloem (UD).

⁹on language: Karolina Krzyzanowska (UD), Marieke Schouwstra (UHD), Fausto Carcassi (UD);

on music: Christoph Finkensiep (UD).

¹⁰Gregor Behnke (UD), Balder ten Cate (UHD), Malvin Gatteringer (UD), Rebecca Reiffenhäuser (UD).

¹¹Tobias Blanke (HL), Davide Beraldo (UD), Roberto Cerina (UD), Bharath Ganesh (UD), Gabriel Pereira (UD), Houda Lamqaddam (UD), Petter Törnberg (UD, at FNWI).

of the evaluation committee, several strategic measures concerning hiring and leadership procedures have been implemented over the reporting period to ameliorate this problem. These include the development of career perspective plans for female members of scientific staff, making use of the Faculty of Science MacGillavry recruitment programme for talented women (in 2019 and 2023), and participation in the [NWO Aspasia fund](#)—and at FGW the establishment of an [internal Aspasia fund](#) to support female researchers in writing grant proposals or other research output. Further strategic measures have focused on scouting for female candidates for hiring procedures, improving female representation in decision-making bodies, and expression of expectations to hiring committees (attention to gender bias, inclusion of female candidates in the short list, etc.).

Thanks to these measures, over the reporting period 3 female researchers have been promoted to Associate Professor and 1 to Full Professor. In addition, we have succeeded in hiring 8 female researchers (cf. Appendix 11.9, Table 37), including 1 MacGillavry fellow. Two additional MacGillavry fellow positions were advertised in 2023 (and as a result two female candidates were hired in 2024). Yet, given the amount of staff hired overall and their gender distribution, gender balance at the institute has unfortunately still not improved sufficiently (cf. Appendix 11.9, Table 36). At the same time, the institute has become more diverse thanks to hiring 5 researchers from the deaf community in 2023 as part of the SignLab. We remain committed to pushing for a more equitable gender distribution at the ILLC.¹² We hope that both the Faculty of Humanities and the Faculty of Science will contribute to provide instruments that help in this respect, e.g., alternatives to the MacGillavry programme as well as establishing a “partner programme” that supports newly appointed female researchers moving to the Netherlands from abroad in finding employment opportunities for their partners.

In order to promote diversity and inclusion more broadly, the ILLC has created a [Diversity Committee](#), with members from all career stages, including Master’s and PhD students, postdocs, senior staff members, and a representative of the ILLC administrative team. The committee is tasked with organising activities, such as workshops on implicit bias training, keeping the ILLC Social Code of Conduct regularly updated, and acting as a point of contact for ILLC with respect to diversity and inclusion initiatives by the UvA.

4.4 Strengthening engagement and societal relevance (addressing G4 and R3)

While ILLC had a large number of both international and local collaborations in place for both research and teaching, it continued to strengthen its collaborations during the evaluation period. In particular it started a new joint PhD programme in Philosophy and Logic with the University of St. Andrews (Scotland), and it supported national and international initiatives such as, e.g., [The Dutch Association for Logic and Philosophy of the Exact Sciences](#), the European [Philosophy of Language and Mind \(PLM\) network](#), and the [Women in Logic](#) organisation.

Over the last few years, the ILLC has also strengthened its engagement with *local* partners both within the academic context and the industrial and societal sphere. One development that contributed to this has been the availability, since 2022, of two new university buildings—Lab42 and the Humanities Labs—designed to be networking hubs. Another development has been the explosive growth of Artificial Intelligence and, in particular, the wider use of *large language models* in science and society. Given the ILLC’s strength in these domains, the institute has actively contributed to and taken advantage of these developments. This has led to several new collaborations and opened up new opportunities for engagement with societal partners.

Lab42. was built as the new international artificial and digital innovation hub in Amsterdam Science Park. It houses not only researchers and students, but companies as well. It is therefore a lively and inspirational environment that brings together research, teaching and entrepreneurship in the information sciences, and in particular AI. Originally, the new building was planned to be the new home of *all* employees of the ILLC and the Institute for Informatics (IvI). However, it transpired that this was impossible due to the enormous growth of both institutes. After careful consideration of all options and in view of the space constraints imposed by the Faculty of Science, the ILLC decided that the three research units most closely related to computational research (TCS, NLP&DH, and LMC) would move to Lab42, while the other three units would temporarily remain in SP107. The move took place in September 2022. The ILLC director and ILLC Office, although mainly housed in SP107, have offices in LAB42 as well.

¹²In line with this commitment, in 2024 the institute was strengthened by three more female senior staff members in addition to the two MacGillavry fellows mentioned above.

While the split that resulted from the partial move to Lab42 is far from ideal for the cohesion of the ILLC, the institute’s presence in the new building has opened up opportunities particularly for collaboration with IvI, an institute with which ILLC works closely together regarding several education programmes. As part of the [AI4FinTech research initiative](#), one assistant professor position with joint appointment at IvI and ILLC has materialised over the reporting period and started on the 1st of September, 2022. Researchers from both institutes have also engaged in new co-supervision of PhD candidates as part of joint projects, for example within the Language Sciences for Social Good and the QISS projects. Furthermore, several ILLC members are part of the [ELLIS Amsterdam Unit](#) on machine learning together with colleagues from IvI. ELLIS membership has opened up networking opportunities within Europe, for example regarding international co-supervision of PhD projects with a machine learning component. Finally, IvI’s [Visualisation Lab](#) is another locus of collaboration between ILLC and IvI, strengthened by a motion capture system provided by our institute.

Humanities Labs. Located in the city centre (in the Bushuis, a historical building used by the Dutch VOC in the 17th century), the Humanities Labs are an initiative of the Faculty of Humanities in response to the increasing use of innovative methods and techniques in humanities research, which require advanced infrastructure and facilities. Like Lab42, the Humanities Labs are set up to be a place of connection between scholarship and society. Two of the current seven labs located in this building are ILLC’s [Music Lab](#) and [Signlab](#). The institute has also developed links with other labs, most prominently CREATE/CUDA_L and the SpeechLab. In contrast to Lab42, these Humanities Labs are not meant as daily working spaces for employees; they are intended to be used primarily for conducting innovative experiments. Researchers from the Signlab, for instance, use this environment to create datasets that can enhance our understanding of the communicative power of hand gestures and facial expressions in sign languages with the use of virtual avatars and other AI techniques. This kind of research has led to collaborations with [ACLCL](#), another research school of the Faculty of Humanities,¹³ and with several extra-academic partners, including [AURIS](#), [NS](#), [Prowise](#) and others.

Societal engagement. The evaluation committee emphasised ILLC’s unrealised potential for social engagement. Indeed, many researchers at the institute carry out research that has direct societal relevance. Sparked by the committee’s recommendation, over the reporting period the ILLC has extended its engagement with society very substantially by actively seeking interaction with industrial and societal partners. By now, many researchers at the institute are involved in collaborations with industrial and non-profit organisations. The collaborations mentioned above regarding the Signlab are just one example. More broadly, the [Language Sciences for Social Good](#) consortium has established partnerships with several non-academic institutions in order to pursue novel language technology applications for an inclusive and safe society, making such technology available to non-mainstream languages as well as to individuals with hearing loss or limited reading ability. In the consortium [Interpreting Deep Language Models for Text and Sound \(InDeep\)](#), led by the ILLC and funded by NWO’s Dutch National Research Agenda, researchers collaborate with companies and non-profit institutions working with language, speech and music technology, to develop new methods for interpreting deep learning models as well as applications that help assess the usefulness of such techniques in tight collaboration with societal partners. In Section 10, we present case studies on the Signlab and on Generative AI which provide additional examples of societal engagement related to language research.

Increased engagement with society has also been prominent in other ILLC research domains. The consortium [Quantum Impact on Societal Security \(QISS\)](#)—led by the ILLC and co-funded by NWO, the Ministry of Foreign Affairs, the Dutch Banking Association, and the Quantum Delta Netherlands Growth-funding Programme—investigates the requirements for a responsible society-wide transition in the context of the emergent Dutch quantum ecosystem. More concretely, it identifies and implements technical, ethical, legal, societal and policy requirements of quantum-safe cryptographic solutions. The consortium brings together scientists from the University of Amsterdam (ILLC, Institute for Physics, Institute of Informatics, and Institute of Information Law), researchers at CWI, QuSoft, and the Fontys University of Applied Sciences, financial institutions (DNB, ABN-AMRO), TNO, the Rathenau Institute, and several national Ministries.

Another example of research with direct societal relevance concerns the Computational Social Choice Group

¹³At the Faculty of Science, the ILLC is one of eight [research institutes](#). At the Faculty of Humanities, the ILLC is recognised as one of six [research schools](#).

within the TCS unit, which has advised politicians, civil servants, and software developers at the Amsterdam Municipality on possible improvements regarding the voting rule used to run the city’s Participatory Budgeting exercises. Finally, we highlight the project [digital Humanities Artificial Intelligence Cultural heritage \(HAICu\)](#) on exploiting computational techniques to preserve and analyse cultural heritage in the form of digitised datasets including books, video, music, maps, photographs, and documents. In the HAICu consortium, AI and Digital Humanities researchers from the ILLC and other academic institutions collaborate with heritage professionals and engaged citizens to open up, link and analyze large scale and heterogeneous multimodal digital heritage collections to facilitate user-assisted generation of fact-based narratives. The project, funded by the Dutch National Research Agenda, was awarded in August 2023 and officially started in 2024.

4.5 Dual approach: tradition and innovation (our main research strategy)

Many of the examples mentioned above illustrate how the ILLC mission and strategic goals have been implemented concern *new* avenues developed or strengthened during the evaluation period. Over this period, other areas with sustained tradition at the ILLC have also experienced substantial growth and maintained their excellence.

The Master of AI grew substantially in the evaluation period, and the ILLC managed to maintain the excellent status of the [Master of Logic](#) programme, which also continued to attract many students. Together with ILLC’s [doctoral programme](#), these are items of particular pride of the ILLC, producing graduates that go on to make a mark on the disciplines they work in. The procedures of these programmes, including admissions, selection, supervision, mentoring, and quality control have been developed and fine-tuned over the years and are working exceptionally well. Of course, as with all aspects of research and teaching, the pandemic and the major shifts in higher education greatly affected these programmes, but we survived that well, and are happy to be back to normal. In recent years, we established a joint doctorate programme with the University of St Andrews (Scotland) and had several joint doctorate students with Tsinghua University (China). In order to increase the level of preparation that our local undergraduate students have for the Master’s programme in Logic, a new undergraduate Minor in Logic & Computation has been established in 2018. This (sub)programme has been flourishing with fourteen students in its initial year (2018–19) and 28, 24, 22 and 22 students in 2019–20, 2020–21, 2021–22 and 2022–23, respectively.

The semantics of natural language continues to be a focal point of our research and we have been particularly successful in acquiring funding for research on Formal Semantics and Philosophical Logic—areas for which the institute has been internationally renowned for decades. See Section 10 for a case study regarding the project [From the Expression of Disagreement to New Foundations for Expressivist Semantics \(EXPRESS\)](#) funded by an ERC Starting Grant. Other examples of projects in neighbouring areas include [Generalisation into sentence and predicate positions](#) and [Cognitive Semantics and Quantities](#) both funded by an ERC Starting Grant, as well as three projects funded by the Open Competition scheme of the Dutch Research Council (NWO): [From Learning to Meaning: A new approach to Characterizing Sentences and Stereotypes](#), [A Sentence Uttered Makes a World Appear—Natural Language Interpretation as Abductive Model Generation](#), and [NØthing is Logical \(Nihil\): Neglect-zero effects in reasoning and interpretation](#).

On Mathematical Logic, as another example, ILLC members acquired funding by NWO for projects on [Cyclic proofs for Modal and Higher-Order Logic](#), and [Derivation Systems for Modal Fixed-Point Logics](#). (see also the case study in Section 10 on Topological Semantics for Modal Logic, which in the last few years has become a strong research line at the institute with worldwide recognition). A full list of funded projects is available in Appendix 11.4.6.

ILLC’s researcher continue to participate in QuSoft (the Research Center for Quantum Software and Technology) and CLARIAH (Common Lab Research Infrastructure for the Arts and Humanities).

4.6 Tracking of products for peers (addressing R4)

In order to address the committee’s recommendation to track the different kinds of products created by ILLC researchers beyond publications, the institute now compiles an [inventory of code and datasets](#) by ILLC staff members hosted on GitHub and Zenodo.

4.7 Monitor relation with faculties (addressing R5)

Despite the organisational differences and different levels of autonomy between the Faculty of Humanities and the Faculty of Science, the ILLC does manage to operate very well in both faculties where it keeps very good relations with all directors and deans. From 2018 onwards, the ILLC planned an annual joint site visit where both deans visit the researchers at the ILLC as well as one annual joint meeting for both deans at the ILLC to discuss the institute's overall daily operations and future direction within both faculties.

While the ILLC would welcome an equal work environment for all its members of staff across the two faculties, in practice we operate within an inter-faculty organisational structure in which the teaching/research ratio and norms differ (40/60 at the Faculty of Science and 60/40 at the Faculty of Humanities). The faculties are transparent about this, however. The ILLC always strives to create a more uniform environment for its members of staff whenever possible (e.g., PhD education, travel money).

As mentioned above, in the evaluation period, the faculty of Humanities was able to regain its strength and this has allowed the ILLC to grow significantly in the Faculty of Humanities.

4.8 ICT infrastructure

Together with the rise in AI research comes the rise in demand of computational facilities, in particular GPU servers. There are three ways the researchers at the ILLC can make use of computational infrastructure at the UvA: (1) UvA researchers have access to a GPU cluster on the [national supercomputer Snellius](#); (2) In September 2024 a Faculty of Science computing server will come online; (3) Individual researchers budget compute in their project applications which totalled €387,000 in the projects granted in the period 2018–2023. These three points combined are sufficient to provide for the computational needs that follow from the institute's scientific goals.

5 Research quality, viability and societal relevance

5.1 Performance indicators

ILLC-members publish in a wide range of different publication types ranging from papers in scientific journals, book-chapters, conference proceedings as well as PhD theses, monographs and edited collections (see Appendix 11.5.2, Table 21). Taking into account the variety of research fields, each having its own publication culture, in which ILLC staff members publish, the most important performance indicators are peer-reviewed publications in academic outlets as well as PhD theses. Besides published scientific work, lectures and courses offered at (summer/winter) schools form an important research product for peers. When the context is well specified, citations are an important indicator in the Exact Sciences for the output published in scientific journals and conference proceedings. The best indicators of recognition and of the overall academic reputation of the ILLC rest on two pillars: the recognition of the individual qualities of its staff members and the international appreciation of the institute as a whole. With respect to the first, we refer to the (personal) grants obtained, editorships of journals and invited lectures at conferences and seminars. An important indicator for the second is the impact that ILLC research published within the period of evaluation had according to the bibliometric analysis, and the attention (in number of citations according to Google Scholar) that a wide range of original trend-setting publications, written by ILLC members, (still) receives. Also the number of visiting research fellows and the number of organised workshops are good indicators of ILLC’s activities for its international community.

With regard to ILLC’s output indicators for ‘relevance to society’, we pay special attention to events (co)-organised for a wider interdisciplinary intellectual community as well as events targeted at high-school students, master students and PhD students. We refer to several outreach and dissemination activities, including publications aimed at a general audience in encyclopedias as well as popular science books. As indicator for the use of research products by societal groups, we point to several kinds of collaborations with industrial and societal parties, including industrial-internships of ILLC PhD students. Further examples of products that can be used by societal groups includes the software that has been developed within ILLC’s research projects or within the consortia in which ILLC members participate. As indicators of the recognition by societal groups, we list special honours and elected memberships of organisations and secondary appointments.

5.2 Research quality

Research Products for Peers

During the evaluation period, ILLC researchers produced a large number of refereed publications: 645 journal articles, 573 conference papers, 24 authored books, and 117 book chapters. In the evaluation period 66 PhD dissertations were completed. The total number of published output shows only minor fluctuations during the evaluation period though with exceptionally many publications in 2023 (these figures are based on all items in Appendix 11.5.2, Table 21 except for the editorships). Overall, we notice an increase in conference paper publications from 80 in 2018 to 110 in 2023. Besides the published output, we see that ILLC staff gives many lectures and courses at summer schools every year, many of which are organised by the [Association for Logic, Language and Information](#).

Use of Research Products by Peers

Several papers published by ILLC members over the evaluation period are cited extremely well (> 1000 times), including some on generative AI (on this topic, see the case study in Section 10.3). To provide more general information about citations, we first highlight the results on Google Scholar indicating that four active ILLC researchers have been cited more than 10,000 times, six researchers between 6,000 and 10,000 times, four researchers between 4,000 and 6,000 times and eight researchers between 2,000 and 4,000 times (see Table 22 in the Appendix). Next, as shown in Table 23, we note that a number of original trend-setting publications written by ILLC members still receive a lot of attention. Perhaps more importantly, the UvA also conducted a **bibliometric analysis**. By pooling the ILLC’s major ‘Topics’ into a custom ‘Research Area’, an automatically generated fingerprint of the institute’s academic niche has been obtained, further referred to as the ‘ILLC Core Area’. This CoreArea shows that ILLC’s 15 largest Topics provide a representative selection of 56% of its

OpenAlex publications which reflect the institute’s main research foci, covering all six research units.¹⁴ This underscores the internal coherence of the institute’s overall research agenda.

Between 2018 and 2023, the ILLC Core Area has produced a total of 280,000 publications worldwide in OpenAlex. A range of bibliometric indicators for ILLC and UvA have subsequently been compared with those of the world’s most active institutions in the ILLC Core Area. This has resulted in a *benchmark*, tailored to the disciplinary main orientation of the ILLC, as suggested by the Dutch Strategy Evaluation Protocol 2021–2027 (SEP). This benchmark shows that the ILLC is a significant player in its Core Area. In the ILLC Core Area top 12, UvA ranks eleventh for total citation count and UvA ranks eighth on both the ‘crown indicators’ Sub-Field Normalized Citation Impact (SFNCI) and Sub-Field Normalized Impact per author (SFNCI/auth), respectively. Despite variations in the volume of *output and impact* across its research units, the ILLC consistently excels in terms of research impact within each field. The unit NLP&DH produced the larger part of the output (38%) and received the larger share of citations at 61%. All the research units have a higher impact than expected in the research areas in which they publish, ranging from at least 51% over the expectation for one unit, to 602% higher than expected in the case of NLP&DH publications, followed by LMC and FSPL as close seconds. In terms of broader impact, research produced by LMC scores highly in its Altmetric attention score, Mendeley readers and number of article views, which indicates broader impact than its direct disciplinary embedding.

Marks of Recognition from Peers

ILLC’s individual staff members were very successful during the evaluation period in obtaining external funding: the Tables in Appendix Section 11.4.6 show that in total 53 research grants were awarded which have funded scientific positions (including 3 VENI, 1 VIDI, 3 VICI, 2 NWA, 2 ERC Starting, 1 ERC Consolidator, 2 Horizon (as coordinator), and 2 substantial infrastructure grants) to a total amount (including smaller grants) of 30,919 k€. During the evaluation period, ILLC members have given numerous invited lectures at a very wide range of prestigious events. Moreover, ILLC staff members were involved in numerous different editorships of journals. ILLC members received an impressive number of paper awards and prizes, awards for theses and books, and reviewing awards during the evaluation period (see Appendix section 11.6). Items of recognition by peers of which we are particularly proud are the [ACM STOC 10-year Test of Time award](#) in 2022 and the prestigious [Gödel prize](#) awarded in 2023 for the same article on theoretical computer science by Ronald de Wolf and co-authors, and the [PODS Test of Time award](#) to Balder ten Cate in 2023 for one of his papers on database theory.

As an indicator for the appreciation of the institute as a whole, and to show that the ILLC initiated groundbreaking research-lines and that we keep building further on this strong foundation of new trend-setting ideas, we highlight some citations in Google Scholar that a range of original papers and books by our emeriti still receive (see Appendix Table 23). The ILLC continues to be a thriving community in which staff members organised 46 conferences or workshops in Amsterdam between 2018–2023 (Appendix Table 24), a community which attracted in this period not less than 99 international research fellows coming from 27 different countries to our institute (see Appendix Section 11.10).

5.3 Relevance to society

Research Products for Societal Target Groups

While individual ILLC staff members are active in a variety of outreach and dissemination activities (see Appendix Table 21), as an institute the ILLC takes specific measures to reach out to a larger population of students and actively promotes events that are targeted to a wider interdisciplinary intellectual community.

An important annual event for high-school students and their teachers in Mathematics, co-organised by the [Korteweg-de Vries Institute for Mathematics](#) and the ILLC, is called *Leve de Wiskunde!*. Its 16th edition in 2018, for instance, attracted no less than 60 teachers and 50 high-school pupils to participate in the event. Furthermore, after the successful ILLC masterclass on Logic for high-school students from 2017, we we organised the [ILLC Master Class in Cognition](#) in 2018 for the same targetgroup, and the [Master Class in Logic for high-school teachers](#) in 2019. These contacts with high-school students and their teachers are opening up new ways

¹⁴Among the 15 largest topics, we find 3 on *Natural Language Processing / Computational Linguistics*, 4 related to *Logic*, 3 on *Semantics and Pragmatics*, and additional topics on *Social Choice Theory*, *Quantum Algorithms and Computational Complexity*, *Music Cognition*, *Scientific Explanation and Philosophy of Science*, and *Language Evolution and Semantic Change*.

for the ILLC to reach out to a larger population of students in the Netherlands, triggered by the fact that logic components have recently been included in high-school mathematics-curricula and logic questions are now part of their exams. This led to a [logic teaching-module](#) co-developed by ILLC member Benno van den Berg for Stichting Wiskunde D-online, used in Dutch high-schools and accompanied by [YouTube videos](#).

ILLC also helps its own graduates to establish contacts with other societal groups. Besides the events organised by UvA such as the [Beta career event](#) and the incubation programme of [Ace Venturelab](#), the ILLC facilitates the contact between students and industry by participating in the [Information Science MSc Thesis Fair](#). The Thesis Fair helps students in the information sciences and organisations (including companies, research institutes and governmental agencies) to find each other. Further, the ILLC also supports the annual [Life after ILLC](#) event (organised by the ILLC PhD Council) at which ILLC/Master of Logic alumni are invited to share their experiences on life after ILLC in or outside of academia.

With respect to events targeted towards a wider interdisciplinary intellectual community, we mention the [ILLC Open Day](#), the [ILLC Blog](#), but in particular well-known conference series that have been supported and organised by the ILLC for many years, such as the [Amsterdam Colloquium](#), the [International Tbilisi Symposium Series on Language, Logic and Computation](#) as well as events such as the E.W. Beth lectures (as part of the Amsterdam Colloquium). Finally, ILLC is involved in the [Dutch Association for Logic and Philosophy of the Exact Sciences](#) and the [VvL Logic at Large Lectures](#).

Besides the outreach activities already mentioned, Table 21 in the Appendix indicates that 25 publications were written in the evaluation period for the general public or a wider academic audience. These publications include, for instance, a range of articles in encyclopedias such as the online [Stanford Encyclopedia of Philosophy](#), of which ILLC maintains a mirror. Some of the books published by ILLC members are also written for a wider audience, and act as popular science books. In particular the books of Rens Bod ‘Een wereld vol patronen’ (Prometheus, 2019)¹⁵ and ‘Waarom ben ik hier? Een kleine wereldgeschiedenis van zingeving’ (Prometheus, 2023) and the books of Henkjan Honing ‘The Origins of Musicality’ (MIT Press, 2018), ‘Music Cognition: The Basics’ (Routledge, 2022) and ‘The Evolving Animal Orchestra: In Search of What Makes Us Musical’ (The MIT Press, 2019). These books were reviewed in several journals and main Dutch newspapers including the Volkskrant, Trouw and NRC Handelsblad. Some of our emeriti published books for the general audience as well: K. Apt, ‘A Brief History of Mathematics for Curious Minds’ (2023, World Scientific), J. van Eijck, ‘Twijfelen aan de werkelijkheid’ (2023, Walburgpers) and P. van Emde Boas (and co-authors) ‘Analyzing the Logic of Sun Tzu in “The Art of War”, Using Mind Maps’ (Springer, 2022).

ILLC members are frequently [featured in the Media](#), in national and international television, radio, and print media to comment on topics of interest to the public. Most prominently Floris Roelofsen on avatars for sign language, Willem Zuidema on generative AI, and members of the [Music Cognition Group](#) on various topics ranging from [the Eurovision Song Contest to the musicality of animal species](#). In 2021, Ashley Burgoyne and Floor Bouwer also gave sold-out public lectures on musical memory and rhythm for the University of the Netherlands at the Paradiso concert hall in Amsterdam.

Last but not least, ILLC was instrumental in organising the fundraising [Logic4Peace](#) conference to financially help our colleagues at universities in Ukraine, and ILLC member Rens Bod co-founded [WOinActie](#), an action group that aims to achieve appropriate funding for Dutch universities, including a limitation of temporary teaching positions. The group lobbied for and discussed with the Ministry of Education the instalment of the so-called ‘Starters- en Stimuleringsbeurzen’, realised via an annual financial impulse to Dutch universities of 300 million euros. (Disappointingly, this financial impulse is threatened to be killed-off by our new government.)

Use of Research Products by Societal Groups

While the ILLC focusses primarily on fundamental research, its members have been increasing their effort to collaborate with industrial partners when their research gave an opportunity to do so. Appendix Table 11.4.5 shows that we were successful in obtaining direct funding for research to a total of 1.804k€, which more than doubled the funding from industrial and societal partners compared to the previous evaluation period. Such partners include [Booking.com](#), [Deloitte](#), [Facebook](#), [Google](#), [SAP](#), [AURIS](#), the ministry of Foreign Affairs, and the municipality of Amsterdam. In addition to partners that directly fund ILLC research projects, ILLC members have collaborated with a wide range of industrial and societal partners in numerous other collaborative [research consortia](#) that sometimes support our research by in-kind matching.

¹⁵Published in English as ‘World of Patterns: A Global History of Knowledge’ (Johns Hopkins University Press, 2022).

Because an important part of the mission of the ILLC concerns the education and training of Master and PhD students, ILLC researchers make sure that our graduates are well equipped to continue their career either within academia or in industry. To build up connections outside academia, industrial-internships are an excellent tool. Several ILLC PhD candidates conducted an industrial-internship in divisions of companies such as Google Deep Mind, Apple, Facebook, Microsoft Research, and Naver Labs Europe.

ILLC’s work in NLP is used by specific target groups to a considerable degree (see also Section 10 for a case study on ILLC’s involvement and impact in Generative AI). These include the method of Google DeepMind on refining large language models, which is based on work by De Cao, Aziz, and Titov; the [LAMBADA](#) dataset from Fernández, Pezzelle and co-workers for the evaluation of many Large Language Models, including GPT3; Abnar & Zuidema’s (2020) algorithm used in [Google AI’s paper](#) introducing the Vision Transformer model; the contribution to [BIG-bench](#) and [GenBench](#), two leading efforts in evaluating the capabilities and properties of LLMs, by Shutova, Tong, Giulianelli & Jumelet and Giulianelli, Sinclair & Takmaz, respectively; ILLC Research on graph neural networks to model online communities in social networks, for hate speech and misinformation detection, which has been integrated into Meta products; Graph neural network variants like [R-GCN](#) developed by Ivan Titov and co-workers have been integrated into widely used libraries such as Deep Graph Library (DGL) and PyTorch Geometric. As part of the ACCESS project, Kamps and colleagues developed a text simplification method used by the Dutch ministry of internal affairs. They also developed [Woogle](#) to make government data publically available. Furthermore, research of Cinà was used in the implementation of an OOD detection module in [Pacmed’s](#) Intensive Care Unit (ICU) decision support system, and in the development and validation of Pacmed’s ICU decision support system, both currently used in 3 Dutch ICUs. Similarly, [Fermionic](#), a firm co-founded by ILLC-member Harry Buhrman and that also employed two ILLC postdocs, designed a quantum emulator that is able to test quantum algorithms at scale.

That two ILLC members co-organised a summit with major stakeholders on “Living guidelines for generative AI in research” at the Amsterdam Institute of Advanced Studies, UvA (June 2023) is an example of more general societal impact ILLC members had. These guidelines and their motivation were published in [Nature](#) (October 2023) and a version of these guidelines was later adopted by the [European Commission](#) in 2024.

Another example of research products for societal groups is the software products developed by the Computational Social Choice Group, aimed at raising awareness for the challenges and opportunities associated with using a principled approach to societal decision making: (i) a software suite of interactive online games to illustrate core concepts in game theory and social choice theory to a broader public. These games were used successfully for both teaching and outreach. An example is the [Logo Game](#), illustrating the concept of the wisdom of crowds;¹⁶ (ii) an online tool, [Pabuviz.org](#), for visualising how different voting rules fare in terms of various notions of fairness on real-world voting data for participatory budgeting, taken amongst others from some 35 such elections in Amsterdam in recent years. The main intended use case is that of scientists illustrating to civil servants and politicians how switching to a modern voting rule would improve fairness in their city; (iii) an [online demo](#) to illustrate, particularly to fellow scientists working in adjacent fields, the approach for explaining voting outcomes the ILLC Social Choice Group has been developing in recent years.

Within EPS, extensive resources have been created on Data-Driven History of Ideas. A suite of software tools and curated datasets for research and teaching have been designed and developed comprising expert-controlled ground truths for the evaluation of word embeddings, high-quality historical corpora (English, German, Greek and Latin) and bibliographic datasets, user testing, infrastructure design, and workflows. We highlight [Hit-PaRank](#) and its Python version [HitPyRank](#), an expert-controlled [paragraph mining tool](#), a ground truth for Quine’s concept of naturalised epistemology, and [ontologies](#) supporting the exploration of the creative industry in the Dutch Golden Age. All materials have been designed and developed by Betti’s team with funding from three CLARIAH fellowships, the NWO infrastructure project Golden Agents and the VICI project e-Ideas. Betti’s team holds a long-standing cooperation with the US library cooperative [OCLC](#) aggregating over 500 millions global library records through WorldCat, the largest bibliographic catalogue in the world.

H. Honing, J.A. Burgoyne, M. Sadakata, and F. Bouwer from the Music Cognition group received in 2021 a [Gewaardeerd!](#) research communication prize from the Royal Netherlands Academy of Arts and Sciences (KNAW), which they used to develop [Toontje Hoger](#), an educational website for the Dutch-speaking public that recreates six classic music cognition experiments with an explanation of the key findings, for example, the

¹⁶A comprehensive software package will be released that will allow researchers worldwide to run these games as well.

(in)famous ‘Mozart effect’ experiments from the 1990s. Toontje Hoger has been featured on Dutch national public broadcasters (NPO) and played thousands of times. The [Amsterdam Music Lab](#) hosts more recent multi-lingual experiments and demos from the group, including That’s My Song, a pilot collaboration with Vanderbilt University Medical Centre to test the viability of using intrinsically motivating musical tasks to conduct research or pre-screening in medical waiting rooms.

Music researchers are also sharing their specific expertise related to music and AI. During the reporting period, researchers have completed projects for Spinnin’ Records and Chordify. Burgoyne co-organises the annual [AI Song Contest](#), which connects industry, artists, and engineers interested in how humans and AI can work together to create music. Prizes for participants included artist residencies at Sony Music Labs Paris.

Several ILLC researchers in all programmes have been part of different [research consortia](#) which have knowledge utilisation work packages. In particular we mention ILLC’s participation in the [Language in Interaction](#) gravitation consortium which develops a range of [apps](#) and popular science articles in [NEMO kennislink](#) based on research from the Consortium. Several ILLC members published dissemination articles in *The Reasoner*.

Recognition by Societal Groups

An important indicator is given by the special honors and elected memberships of ILLC members by societal groups and organisations. Four of our staff members (R. Bod, H. Buhrman, H. Honing, and S. Smets) and three emeriti (R. Bartsch, J. van Benthem and M. Stokhof) are members of the Royal Dutch Academy of Arts and Sciences ([KNAW](#)); M. Aloni and S. Smets are member of the [Academia Europaea](#), just like three of our emeriti (K. Apt, J. van Benthem and P. Vitanyi). R. Bod and H. Honing are members of the Royal Holland Society of Sciences and Humanities ([KHMW](#)), the oldest learned society in the Netherlands. J. van Benthem is member of the [American Academy of Arts and Sciences](#), and honorary member of the European Association for Logic, Language and Information ([FoLLI](#)), and also received a Knighthood in the [Order of the Lion](#) of the Netherlands (already in 2014) in recognition of his myriad research accomplishments and the leading role he has played in the academic community. S. Smets is corresponding member and J. van Benthem honorary member of the Academie Internationale de Philosophie des Sciences [AIPS](#). J. Baeten was appointed Officer in the [Order of Oranje-Nassau](#) in 2021, in recognition of his longstanding contributions to Mathematics and Computer Science. J. Baeten was also elected Honorary Fellow of the Dutch National Association for Software Engineering ([VERSEN](#)) in 2023, just as P. van Emde Boas in 2021. P. Vitanyi and his coauthor Ming Li received a 2020 [McGuffey Longevity Award](#) for their textbook on Kolmogorov complexity and its applications. R. Bod received the [Medal of the University of Ghent](#) and the International [Francqui Medal](#) (and associated chair) both in 2021. U. Endriss was installed as [Fellow](#) of the European Association for Artificial Intelligence (EurAI) in 2023, an honour bestowed in recognition of “significant, sustained contributions to the field of AI in Europe.” When employed at the ILLC, B. Löwe was a member of the Academia Europaea, of the Académie Internationale de Philosophie des Sciences (AIPS), and of the [Akademie der Wissenschaften in Hamburg](#). During that time he was also a College Professor and Bye Fellow at Lucy Cavendish College, in Cambridge. H. Dijkstra was installed as director of the [Institute for Advanced Study at the University of Amsterdam](#) in 2021. T. Blanke was installed as [University Professor](#) of Humanities and AI at the UvA in 2019.

Secondary appointments: K. Apt is Affiliated Professor at the University of Warsaw. J. van Benthem is emeritus UvA University Professor, Henry Waldgrave Stuart Professor, Stanford University (philosophy and CSLI) and Jin Yuelin Professor, Tsinghua University Beijing (philosophy). S. Smets was from 2019 to 2022 (also) professor at the University of Bergen. Since 2020, she is the Vice President of the Association for Logic, Language and Information (FoLLI). M. Stokhof was from 2014 to 2019 member of the scientific council of the European Research Council (ERC). He chaired the ERC’s Open Access working group and from 2017 to 2019 Stokhof served as vice-president of the ERC and coordinator of its Social Science and Humanities domain.

ILLC members are regularly invited to take up memberships in selection committees of funding agencies. In the last six years ILLC employees were members (sometimes chairs) of selection committees for ERC Starting, Consolidator and Advanced grants, NWO Veni, Vidi and Vici grants, and NWO Open Competition grants.

ILLC members also participate in societal advisory bodies offering expertise on various topics, including quantum computing, Dutch Sign Language, and the role of language in transgressive behaviour.

6 HR, academic culture, open science, and PhD programme

6.1 Human Resources

The ILLC’s mandate in personnel matters in the two faculties differs greatly. In the Faculty of Humanities, it is the faculty that determines at which departments and at which research institutes new staff members can be hired. In this process, the research institutes only have an advisory role. The research institute is consulted when a new recruitment profile is made, and at least one representative of the research institute (normally the director) is a member of the selection committee. In the Faculty of Science, on the other hand, it is the research institute that decides to create a new position or to fill a vacant one, that draws profiles, sets up selection committees, prepares proposals for tenure or promotion, and so on. Employees are also given the opportunity to establish career plans for promotions in accordance with the faculty promotion criteria and in coordination with the ILLC director. In the case of tenured positions, or promotions to associate professor, the final decisions are taken by the Dean of the Faculty, for non-tenured positions this is delegated to the director of the ILLC. For full professorship, the Executive Board of the university is always responsible.

Also the regulations for supervising the personal development of members of staff are different in the two faculties. The performance of staff members employed by the Faculty of Humanities is assessed annually by the head of the department (or sometimes chair of the *capaciteitsgroep*) at which they are employed. The director of the ILLC has an advisory role here. The staff members employed by the Faculty of Science have an annual performance interview with their unit leaders (though full professors of FNWI have their annual meeting with the ILLC director). In this case, unit leaders report to the director of the ILLC and advise him/her about the terms of employment for the staff members concerned. All employees are assisted in grant applications; by direct colleagues, but also by IXA-team members. At FGw, all staff members can apply for a temporary increase of research time for writing a grand application or for strengthening their track record to do so.

The ILLC adopts the principles behind the so-called [Recognition and Rewards](#) program.¹⁷ In accordance with this programme, performance and career paths of employees of the ILLC — in as far as we have any influence on that (see above) — are based not just on their impact in research, but on other qualities and activities as well, including education, team-contribution, organisation, impact and outreach. For promotions to higher-level positions, at FNWI the ILLC is, for instance, less stringent on acquisition of grants than the supplementary Promotion criteria of the faculty call for, if this factor is outweighed by other qualities and activities. At FGw raising staff to a higher position follows the permanent staff position principle. This means that apart from staff having to qualify for a higher position, in the personnel plan there should be space for somebody in this position as well. Leadership is one of these other qualities, and ILLC employees that (are expected to) take up such leadership positions are stimulated to follow leadership courses organised by the University.

As discussed in Section 4.3, the ILLC has taken several measures to improve inclusion and especially gender **diversity** in the evaluation period.¹⁸ In addition, the faculties offer a wide variety of training programmes in the area of [social safety, inclusion and bias free selection](#).

The ILLC Office is the main support unit of the scientific staff at ILLC and most often their first point of contact with the administration. The structure of the ILLC Office did not change as a result of the change in research structure of the ILLC (cf. Section 1.2). Although the members of the ILLC office are all employed at the Faculty of Science, the office also functions as support unit for the ILLC members employed by the Faculty of Humanities. The office is responsible for all key administrative processes ranging from HR, ICT, communication to building facilities. In all such matters the ILLC Office is in close contact and coordination with the Faculty of Science or the Faculty of the Humanities, depending on the matter at hand. Apart from administrative support, the ILLC sees a rise in research support staff from 2.9 fte in 2018 to 4.5 fte in 2023 (Cf. Table 5, in Appendix 11.3) and more in 2024. Research support staff are employed at both faculties. Research support staff take part in the research process, often in the implementing stage, and are not part of the ILLC Office. E.g., many are scientific programmers.

¹⁷From April 2023 this UvA programme is chaired by ILLC professor Huub Dijkstra.

¹⁸Machiel Keestra, an ILLC staff member, is since February 2022 the central diversity officer at the University of Amsterdam.

6.2 Academic Culture

The ILLC wants to create a stimulating and safe environment for research. ILLC's very flat organisational structure encourages this: although all scientific employees have a more senior colleague as their line-manager, new employees are encouraged to develop their own research-line, independent from their more senior colleagues. The ILLC strengthens this culture by regularly changing people's administrative roles: your current 'subordinate' can be your line-manager (e.g., ILLC director or unit leader) later. Although the ILLC director is always a full professor, unit leaders need not be (and typically are not).

To promote exchange of information and to mutually inspire the generation of ideas, the ILLC organises numerous meetings and (bi)weekly [seminars](#). Although the seminars are open to all, ILLC members typically attend only some seminars regularly. Still, at most seminars (e.g., DIP and LIRa), members of several ILLC research units are involved (cf. Section 4.1). At these seminars, either external speakers are invited, or ILLC staff discuss their own work. The research units typically organise internal (research and organisational) meetings as well for their staff only, while other meetings are provided for the whole ILLC community. These latter include the research oriented *ILLC Colloquium* that is organised 3 times a year jointly with the *ILLC-Current Affairs* meeting, and the additional *staff meetings*, including an annual off-campus *Heidag*. At these latter meetings, updates are provided on ongoing developments and strategic matters are discussed. In addition to some other organised social activities, these are all viewed as essential for our academic culture and the sense of belonging to our institute, as they provide opportunities to meet other staff members, to discuss and exchange ideas, and be inspired by colleagues. Further ILLC-issues are communicated via the [ILLC-homepage](#) and the weekly ILLC-news distributed via email.

The ILLC is also dedicated to providing a welcoming and supportive environment to all members of its community. This includes contributing to an ethically safe home for its employees. The range of ethical and privacy issues that researchers and students can encounter in academia is very wide, it includes all types of fraud, misrepresentation, privacy-breaches, the stealing of ideas, plagiarism etc. [ILLC's Code of Social Conduct](#) and its [Code of Scientific Integrity](#) list a number of do's and don'ts that should be ingrained in the work ethics, and hence the day-to-day practices, of everyone who is engaged in research in some way or other (as an active researcher, as a student, as a supervisor, or as an administrator).¹⁹ Both code of conducts are discussed explicitly during staff meetings, and meetings of the management team with the PhD students, also included in the ILLC welcome package for new staff members, and can be found at the ILLC webpage and at several places in the buildings where we are housed. Depending on the circumstances any undesirable behaviour or situation can be discussed with the supervisor, manager or director of the institute. If this is not possible, the Person of Trust of the faculty or a 'confidential advisor' from the university or the university Ethics Committee can be consulted. Collaborations with third parties that may involve ethical dilemmas are evaluated by a dedicated advisory committee, in line with UvA's policy framework (Beleidskader Samenwerking met Derden).

6.3 Open Science

Open Science includes open data, materials and code, reproducible analyses, preregistration of experimental setups and of manuscripts, and open-access publication. The ILLC encourages preregistration of experiments and promotes publishing papers as open-access by utilising the open-access deals of the UNL (Universities of the Netherlands).²⁰ In the reporting period, about 81% of our publications were open access via this method. Unfortunately, the UNL doesn't have such a deal with all publishers. In line with the Dutch copyright law (2021) we stimulated researchers to make their closed publications available in manuscript form, six months after the official publication. From 2024 on all (shorter) UvA publications will become *automatically* open access half a year after publication via article 25fa of the Dutch copyright law (a.k.a. [Amendement Taverne](#)).

The ILLC aims at an open science environment that is efficient and in line with requirements of the university, research funders and legislation (such as [FAIR](#) data practices). UvA's data stewards, appointed via its research data management initiative since 2017, are used to handle the requests for storage space, manage items and questions of researchers on data storage and take care of curation workflow. In addition UvA's research data management website provides its researchers with all information about required data management in line with

¹⁹All officially submitted student reports (by Turnitin) and PhD theses (i-Thenticate check) are checked for plagiarism.

²⁰In addition, many ILLC employees at FNWI publish their pre-prints at ArXiv.

the Netherlands Code of Conduct for Scientific Practice or the Code of Conduct Applied Research for Higher Professional Education, it provides access to storage-facilities and offers information on how to design of a data management plan. It is policy of the ILLC that that prior to starting a new project, researchers plan where their data will be long-time stored, and whether and how the results will be made available for the general public. To train the new generation in issues of integrity, the ILLC PhD programme organises a Research Integrity Training for its PhD candidates with the aim of encouraging them to reflect on a number of dilemmas and problems that are directly related to their research situation.²¹

The ILLC has compiled an [inventory](#) of code released by ILLC researchers. In particular, we try to provide a [complete index](#) of all ILLC code hosted on GitHub. The UvA recently started hosting their own GitHub repository and we expect staff members to start using that resource more frequently in the future as well.

6.4 PhD programme

The principal aim of the [ILLC PhD programme](#) is to create a stimulating, diverse and inclusive environment where PhD candidates receive highly qualified training and supervision in one of the ILLC relevant areas but at the same time also profit from the unique interdisciplinary nature of the institute, combining the humanities and the exact science in a blend of philosophical tradition and modern technologies, mathematical rigour and experimental research. In December 2023 the ILLC PhD programme hosted 71 PhD candidates spanning the 6 ILLC research units: NLP&DH (23), TCS (16), FSPL (16), MCL (7), EPS (7), LMC (2).²²

	2018	2019	2020	2021	2022	2023
intake	11	15	13	17	19	19
graduations	13 (5/8)	6 (1/5)	17 (4/13)	13 (5/8)	6 (4/2)	11 (1/10)

Table 2: Annual intake and graduations ILLC PhD programme (humanities/science)

Sixty-six (66) PhD candidates graduated during the reporting period (41 in previous period, an increase of 60%). 38% of these candidates graduated within 4 years, 64% within 4.5 years, 74% within 5 years and 83% (55/66) within 6 years.

Success and dropout rates of the cohorts 2015–2019 confirm these numbers. Of the 63 PhD candidates who started in these periods, 32% graduated in 4 years, 55% in 4.5 years, 71% in 5 years, and 81% in total. 11 candidates (14%) dropped-out of the programme. The reasons for drop-out range from personal or health issues to academic problems (e.g., a mismatch between task and expertise of PhD candidate).

Cohort	<i>N</i>	within 4y	within 4.5y	within 5y	total	dropout	overdue
2015	13	2 (15%)	5 (38%)	7 (54%)	9 (69%)	4 (31%)	0 (0%)
2016	16	2 (12%)	8 (50%)	10 (62%)	13 (81%)	3 (19%)	0 (0%)
2017	8	6 (75%)	6 (75%)	7 (87%)	8 (100%)	0 (0%)	0 (0%)
2018	11	4 (36%)	7 (64%)	9 (82%)	9 (82%)	2 (18%)	0 (0%)
2019	15	6 (40%)	9 (60%)	12 (80%)	12 (80%)	2 (13%)	1 (7%)
total	63	20 (32%)	35 (55%)	45 (71%)	51 (81%)	11 (17%)	1 (1%)

Table 3: Success and dropout rates (data collected in September 2024)

The institute should keep monitoring completion rates of PhD candidates and, if necessary, take further measures to increase the numbers of PhD candidates completing their degree in a timely fashion. The ILLC’s PhD programme was installed during the last evaluation period and is now fully operational, with close progress meetings to monitor a plan of action in the last PhD year. This has increased the number of PhD candidates that

²¹This training is based on the so-called ‘Dilemma Game’, designed by Erasmus University Rotterdam in which different dilemmas are discussed and participants are asked to debate the best course of action and to reflect upon the possible consequences.

²²Language and Computation roughly split into NLP&DH and LMC (25), Logic and Computation roughly split into MCL and TCS (23), Logic and Language roughly split into EPS and FSPL (23) .

finish on a timely fashion significantly. In the previous evaluation only 51% of the PhD candidates graduated within 5 years (based on analysis of cohorts 2008–2014), now 71% (cohorts 2015–2019), see also Table 26.

Of the 66 ILLC graduates who defended their theses during the evaluation period, 41 (62%) found a position in academia directly after graduation (15 of them (23%) hold now Assistant Professor (or equivalent) positions at universities such as UvA (3), UConn, Tsinghua Beijing, Munich, Queen Mary College, Pompeu Fabra Barcelona, Saint Etienne, Copenhagen and more), 25 (38%) found jobs outside of academia, in many cases working as researchers in a company²³ or in a non-academic research institute (e.g., TNO).

Because of its interdisciplinary nature, the ILLC hosts candidates employed at the Faculty of Science and the Faculty of Humanities, as well as candidates with external funding, including joint degree candidates (St. Andrews, Tsinghua, Stanford and others).

Instruments to guarantee quality. The main challenge for the ILLC PhD management is to guarantee high quality training and equal opportunities to all members of this diverse community. The ILLC ensures the achievements of these goals in a number of ways.

First, each PhD candidate in the programme is assigned at least two supervisors. Within the first three months of their appointment, the PhD candidate and their supervisors put together a Teaching and Supervision Plan (TSP), which outlines the PhD project, specifies the different roles within the supervision team and formulates the candidate’s tasks and goals, including training and teaching plans. The TSP plan is reassessed every year during the PhD candidate annual evaluation meeting. The ILLC PhD training programme consists of a scientific programme and a skills development programme. The skills programme consists of courses providing training in “transferable skills” such as (1) project management; (2) scientific integrity; (3) academic writing; (4) presentation skills; (5) career development, and (6) teaching skills.

Second, the PhD training programme and the education and work environment of the PhD candidates are evaluated every year by the PhD Programme eValuation Committee (Dutch abbreviation ‘PVC’). The PVC produces a report to which the ILLC management responds in written form. Both documents are published on the PhD programme webpage and discussed during the regular staff meetings. In case these evaluations indicate problems the PhD programme director can take action, for example rediscuss individual supervision agreements, revise some of the procedures or put in place new initiatives. Examples of recent initiatives inspired by past PVC reports include the buddy system introduced in 2022 (at the start of their appointment, each PhD candidate is assigned a “buddy”, a more senior PhD candidate who can guide them through the first period of their project); and the supervision lunches introduced in 2023 (twice a year ILLC staff members lunch together and discuss general issues concerning the PhD programme and share experiences and good practices in the supervision of PhD candidates).

Third, the directors of the institute and of the PhD Programme hold regular meetings with the ILLC’s PhD council to discuss issues regarding the PhD programme and the welfare of PhD candidates, and, twice a year, the ILLC management meets with the whole PhD community in a plenary PhD assembly. The PhD council and the PhD social committee further organise regular social activities to foster cohesion within and across the groups. These activities are financially supported by ILLC.

Fourth, to minimise the financial differences between employed and externally funded PhD candidates, the faculties top up the scholarships by a variable amount to meet the minimum threshold set by the UvA. The minimum threshold was €1,500 in 2022 and raised to €1,575 in 2023 (yearly indexation). Furthermore, the ILLC guarantees to every PhD candidate a travel budget of €2000 and a training budget of €1000 per year irrespective to the nature of their contract (part of the personal budget of PhD candidates from the Humanities is contributed by the Faculty of Humanities).

²³PhD alumni now hold positions at companies such as [Microsoft](#), [Facebook](#), [Funda](#), [Adyen](#), [Google](#), [eBay](#), [Knights Analytics](#), [Elsevier](#), [ING-bank](#), [Pacmed](#), [Deltares](#), and [Apple](#).

7 SWOT analysis

7.1 Strengths

- S1. ILLC staff is composed of productive and world-leading researchers who perform cutting edge research within an international context (cf. §5.2).
- S2. The institute has a strong track record in obtaining highly prestigious personal research grants (cf. §5.2).
- S3. The ILLC offers a wide and thriving interdisciplinary research programme within the Faculty of Science and the Faculty of Humanities (cf., e.g., §4.2 and 4.5).
- S4. The ILLC has a large network with fruitful local, national and international collaborations (cf. §4.4).
- S5. The ILLC has a high-quality PhD programme with an excellent placement-record, which benefits from and contributes to an excellent research environment (cf. §6).
- S6. Research at the ILLC is interwoven with teaching in a wide range of educational programmes across two faculties, including the international Master programmes in Logic (for a dedicated case study, see §10), AI, Brain and Cognition, Mathematics, Philosophy, Media Studies and Computer Science. In addition we are involved in interfaculty education programmes like Computational Social Science.
- S7. ILLC researchers are proactively engaged in debates on the societal relevance and impact of key technologies in AI and secure Quantum communication (cf. §5.3).
- S8. ILLC’s researchers lead two of the [Humanities Labs](#) at the Faculty of Humanities: the SignLab and the MusicLab (cf. §4.4).

7.2 Weaknesses

- W1. Different conditions in HR-policy are in place for promotions of academic staff members across the Faculty of Science and the Faculty of Humanities (cf. §1.2).
- W2. The teaching load of ILLC staff members differs (cf. §4.7). This creates an imbalance within the institute.
- W3. Due to the multi-locations of the ILLC at Science Park and in the city centre (cf. §4.4), it takes more effort to maintain the coherence of the institute.
- W4. While ILLC’s wide interdisciplinary research programme is its main strength (cf. §1.2), it is not easy to *present* it in terms of the disciplinary topics that are known to funding agencies and to the outside world.
- W5. While ILLC researchers are gaining strength in their collaborations with industry (cf. §4.4), there is still room for improvement.
- W6. The ILLC is not strongly represented in national and international advisory boards of funding agencies.
- W7. The ILLC has limited diversity among its staff members, and in particular still a poor gender balance (cf. §4.3).

7.3 Opportunities

- O1. With our combined strength of problem-solving skills from the sciences and the holistic and reflective view of the humanities (see §8), the ILLC is uniquely situated to help shape the societal transformation induced by generative AI, which is receiving massive interest from society, funding agencies, and industry.
- O2. Due to the concentration of the information sciences at Lab42, and ILLC’s participation in the FGw’s Humanities Labs (cf. §4.4), new opportunities open up for collaborations between the ILLC and the Informatics Institute (IvI) and the Amsterdam Center for Language and Communication (ACLC), respectively, as well as to new valorisation opportunities.

- O3. Due to our interdisciplinary orientation (cf. §1.1) we are well positioned to attain new funding from UvA internal collaborative initiatives.
- O4. ILLC researchers' participation in QuSoft and CLARIAH (cf. §4.5) opens opportunities for new local and national collaborations, e.g., within the context of the government-funded national quantum programme.
- O5. The ILLC expects to benefit from the *starting packages* for new staff members and *stimulation grants* for other permanent staff members (i.e., the *Starters-* and *Stimuleringsbeurzen* mentioned in §5.3.). These grants are installed by the Dutch ministry of Education and distributed via the universities. Via these grants, new staff members can receive funding to hire a PhD student, and permanent staff members have a chance to temporarily increase their research time.
- O6. The institute's international research position is strengthened via involvement of the ILLC in the [ELLIS Network](#) and (new) collaborations on logic with various partners in Europe (e.g., St. Andrews) (cf. §1.1), the US (Stanford) and China (Tsinghua), also to create opportunities for more joint PhD positions.
- O7. ILLC's growth of staff (cf. §4.2) brings new opportunities as we expand our network, attract new visitors, and reach out to different communities world-wide.
- O8. ILLC staff members at the Faculty of Humanities can apply for a temporary teaching release to prepare for applications via the Research Innovation and Sustainability (RIS) Fund and the Consortium Fund.

7.4 Threats

- T1. The plans of the new Dutch government involve constraints on research budget and on the universities' language policy. These plans can have an impact on the financial situation of the institute, make our international scientific collaborations more difficult, they can affect the enrolment of new international students, and influence the hiring of new international staff members, including administrative staff.
- T2. The increasing preference of funding agencies for applied research creates opportunities in natural language processing and digital humanities, but threatens ILLC's more theoretical research lines. The current trend of funding a smaller number of larger projects also reduces the overall success rate of grant applications.
- T3. The continuity of the leadership of the Music Cognition Group is under threat with the upcoming retirement of its only full professor, in a unit that does not have any associate professors among its members.
- T4. The unavailability of affordable short-term housing by the University of Amsterdam, poses a problem for academic visitors, new students and new staff members.
- T5. The competition of AI research with Big Tech continues and makes it more challenging for universities to keep control over the research agenda on AI. There is a danger that universities are excluded from technological developments in AI for lack of the required resources.
- T6. The ILLC faces challenges with hiring and retaining staff. Not only can the university not compete with the hiring-conditions that are offered by Big Tech companies in areas related to AI, the University of Amsterdam also does not yet have a well-developed partner-hire-help programme and the ILLC does not have many senior female role-models in logic and computer science.
- T7. International political developments might have an impact on joints cooperations. In particular, although the University of Amsterdam and Tsingua University agreed in 2023 on a continuation of their Joint Research Centre for Logic, future developments might interfere.
- T8. The standard way academic research is done (also at our institute) might be disrupted by the emergence of chatbots like ChatGPT that use Large Language Models.

8 Mission for the next six years

The ILLC is home to a thriving community of scholars, including philosophers, logicians, mathematicians, computer scientists, linguists, musicologists, and cognitive scientists, who share a fascination with the interdisciplinary study of information. At the ILLC we combine the problem-solving skills from the exact sciences with the holistic and reflective view of the humanities to discover the principles that regulate information processing and find answers to some of the hardest challenges of our time. We approach this goal through three interdisciplinary themes, each of them permeating through most of our research units:

- **Learning & Reasoning:** What are the elementary building blocks of reasoning? Can machine learning help us to get insights about how humans learn? What are successful strategies for solving hard reasoning problems efficiently? What counts as an explanation in different scientific fields?
- **Language & Communication:** How is it possible that a sequence of sounds, gestures, or written symbols can convey highly complex ideas and subtle feelings? What are similarities and differences between language and music, and other forms of communication? What allows people to flexibly communicate and how can we emulate this in machines to foster human-machine cooperation?
- **Technology & Society:** How can we enhance the societal benefits of digital technologies, ensuring they are more transparent and responsible? What are the opportunities and threats of technology for democratic values, justice and equality? How do new technologies reshape our cultures, identities, and social communities?

We investigate these fundamental questions with a rich array of methodologies—ranging from logic and mathematics to machine learning, experimental studies and philosophical analysis—to advance scientific knowledge, stimulate critical reflection, fuel technological innovation, and serve and inspire society.

The ILLC provides an inclusive and welcoming work environment, where different forms of talent are recognised and rewarded. We are convinced that diversity stimulates the institute’s academic culture, enhances individual well-being, and contributes to improve research quality. Finally, researchers at the ILLC champion the Humboldtian model by closely interweaving research and education both at the Master’s and the Doctoral level, where education is intimately integrated into the research vision of the institute.

9 Strategic goals and their implementation for the next six years

ILLC's future strategy and its implementation for the upcoming six years is organised into four pillars concerning research content, internal synergies, external alliances, and human resources policy.

9.1 Research tradition and innovation

The research portfolio of the institute is a blend of areas where we have built a reputation over decades (e.g., the use of logic in mathematics, computer science, philosophy and linguistics) and new trends (such as quantum computing, generative AI, and the use of computational methods in the Social Sciences and Humanities). While building on this legacy of earlier pioneering work, ILLC has always been successful in creating the space where new ideas can constantly be tested and expanded. A strategic goal of the ILLC is to keep promoting the dual approach of tradition and innovation: maintain excellence in those areas for which the ILLC has built a reputation over decades, while also exploring new avenues of research that complement the traditional areas.

In the new mission statement we have identified **three interdisciplinary themes** we will focus our research on. For each of these three themes, we want to combine ILLC's research tradition with innovative ideas. This combination seeks to improve the relation between our theoretical research lines with research that more easily gives rise to practical impact. As for research innovation, this will give rise to the following future targets:

- Within the theme **Learning and Reasoning** we plan to combine our strength in *deductive* logic with the use of *inductive reasoning* methods in AI. This includes the integration of symbolic and subsymbolic AI to make AI systems more transparent and explainable, the use of machine learning techniques for automatic reasoning and planning, and to investigate and improve how Large Language Models learn to reason.
- Within the theme **Language and Communication** we plan to work on new topics like the possibilities of communication in non-ideal circumstances, the semantics and pragmatics of Large Language Models, the improvement of their interpretability and explainability using causal interventions, and we will concentrate more on AI applications for multi-modal communication, including sign-language and music.
- Within the theme **Technology and Society** we will make use of our unique situation at the intersection of the humanities and the exact sciences to bring technical insights to understand the regulatory and societal implications of the current AI revolution. We will develop and leverage AI systems for societal good, such as to shape more productive information ecosystems and improve democratic decision making.

We foresee that research in Quantum Computing at the University of Amsterdam will continue to gain more and more autonomy. We look upon this development with great pride, knowing that it was made possible not least through the open research environment offered by the ILLC. For the years to come, we expect to continue to be able to contribute, while also benefitting, both scientifically and financially, from developments and investments in this domain. Throughout, we plan to maintain the ILLC's characteristic profile of research in the area, bringing together algorithmic, logical, and societal perspectives.

9.2 Internal synergies

The ILLC pursues its scientific mission by creating an environment that enhances curiosity-driven research and can serve as a rallying point for information scientists across research fields. ILLC's interdisciplinary nature, its multi-location, and its recent growth, however, all put the identity and coherence of the institute under pressure. We aim to uphold the institute's identity and coherence by reinforcing the synergy between the different research units and enhancing the feeling of 'belonging' among ILLC members, while at the same time improving visibility to the outside world.

1. The three interdisciplinary themes provide also a new focus for our ongoing cross-unit collaborations.
 - The theme **Learning and Reasoning** connects research that relates deductive and inductive reasoning processes and their evaluation that permeates all six research units.

- The theme **Language and Communication** also connects all our research units, ranging from formal semantics and NLP, via multi-media modelling to the conveying of subtle feelings via music.
- The theme **Technology and Society** is becoming increasingly important for the ILLC. It includes the use of AI to improve the common good, as well as the reflection on the opportunities and threats of technology for democratic values, justice and equity.

We will use the ILLC colloquium that is organised three times a year to focus on each of these three themes at least once a year with the whole ILLC community, and follow that up with cross-unit working groups on promising concrete topics that come up during these meetings. Whether cross-unit collaboration has increased can be checked, e.g., by a new bibliometric analysis that measures co-authorship (like now in Table 11.5.5 of the Appendix).

2. We want to **re-evaluate our new organisation** into six research units and organise more opportunities for exchange and collaboration.
3. After the strong growth in the last years, we now want **optimise its operations** to facilitate staff members' research, teaching, funding acquisition, and valorisation activities. The ILLC Office will remain the central unit for administrative support of the ILLC. In order to assist the researchers in reaching their goals there are several strategies that are adopted. The ILLC Office continues to believe that management processes can be made more efficient with the help of a dedicated programmer. For many years this job is done by [Dr. Marco Vervoort](#), an ILLC alumnus and co-owner of [Greenlightsolutions](#). Within the UvA, and because we work in two faculties, it has always been advantageous to have some autonomy when it comes to information systems. The ILLC website, the ILLC news letter are all part of our internal and external communication. An ILLC database, maintained by ourselves helps management to monitor and act upon many facets of the ILLC administration: progress of students and PhD candidates, tracking of annual consultations and assessment interviews, and so on.²⁴ The ILLC Office has recently set up an ILLC wiki (<https://wiki.illc.uva.nl/>) for researchers, where information, complementary to the information published by the faculties may be found, but also ILLC internal policy rules. This will help with communicating to the community rules, regulations, tips and tricks. In order to assist the vice-director of Education the ILLC Office will launch a teaching/activities registering and planning tool, with which we will be able to assign staff to courses with more ease and to keep track of all the management tasks staff members execute.

9.3 External alliances

The ILLC strives to build strong alliances with local, national and international organisations. The goal is not only to intensify cooperation with other academic institutions, but also to strengthen collaboration with industrial partners and societal organisations, while maintaining our identity and ensuring that procedures and governance structures adopted in such collaborations support our research agenda. As mentioned in Section 7.3, we think there are also various opportunities to reach this goal. In particular, we plan the following:

1. Collaborate in and/or start new **consortia** on the topics of the mentioned three themes (e.g. new RPA's, Dutch Gravity Programme, Synergy Programme, etc.)
2. Further **improve visibility** by presenting our research thematically in terms of 'big questions' that members of our institute are trying to solve as stated in the new ILLC mission statement. Launch a website ([certAIn.nl](#)) displaying to potential collaborators and the general audience our work on explainable, responsible, and theory-driven AI. Use our strengths in research-based teaching in our top educational programmes (e.g., the [Master of Logic](#), the [Master of AI, Media Studies](#), and [Philosophy](#)) to enhance the whole institute's visibility both locally and internationally. Provide master classes on AI for people in industry at the UvA Academy in the context of '[Leven Lang Leren](#)'. Increase our efforts to engage the general public with our work during open-days, masterclasses, etc.

²⁴By way of example, see for instance [this page](#) for a description of the personal timeline and tracking page which is used by the PhDs, supervisors and administrators.

3. **Design a clear valorisation strategy** to increase ILLC’s collaborations with industrial and societal partners (e.g. setting up ICAI-labs, strengthen connections with alumni, establish an industrial fellowship programme, extend industrial internship options, collaboration with Amsterdam AI, etc.)
4. **Stimulate the link between research and education**, involving students of various programmes in ongoing research projects and collaborations. Our contribution to the Humanities Labs serves as a means to support and showcase this collaborative research and its societal impact. To reach this goal it is crucial to secure structural funding for infrastructure of the MusicLab and SignLab.
5. Encourage ILLC staff members to take up **memberships** in strategically well-positioned committees in order to be **presented in scientific councils** at national (e.g., NWO) and European level.
6. Make use of the strong international reputation of the ILLC (and stimulation grants) to set up more **joint PhD programmes**, in order to facilitate a steady intake of PhD candidates for areas where obtaining external funding is more challenging (such as for mathematical logic and formal philosophy).
7. **Systematise contact with ILLC-alumni**, including those working in industry.

9.4 Human resources policy

As stated in the ILLC mission, we aim to implement measures to further enhance diversity and attract and retain staff members from underrepresented groups. More generally, two of the strategic goals of the ILLC for the upcoming period concerning human resources policy are (i) to improve the process and the outcome of career development plans and (ii) to optimise the institute’s daily operations to facilitate staff members’ research, teaching, funding acquisition, and valorisation activities. More concretely, we plan the following:

1. **Seek replacement** of researchers crucial to ILLC’s identity when they leave. Currently, this holds in particular for Prof. Henkjan Honing and the Music Cognition Group after his retirement.
2. Look for further measures to **improve the gender balance** and create a more inclusive research environment.
3. Offer **career perspectives** to members of staff whenever possible. Introduce career plans for every new employee after they have become permanent employees, and discuss at each annual meeting with their line-manager about the possibility of career developments, or what is needed to accomplish that.
4. Strengthen **staff mentor-programme** (senior staff helps and guides junior staff members) and assure that staff members who need it receive **coaching** and that enough attention is given to maintaining a healthy work-life balance.
5. Monitor all research output and celebrate research achievements. Design a **research-step-plan**, i.e., a plan to get in a better position to, e.g., obtain research funding, for those who need it in preparation for obtaining a more competitive research position in academia (e.g., for future grant applications).
6. Continue to **encourage staff to apply** for research funding and offer ILLC’s know-how in preparing for individual and collaborative grants.
7. Take further measures to ensure that our **PhD candidates finish** their thesis **on time**. Although most ILLC PhDs finish within 4.5 years, there is still room for improvement. These measures include following FGw with their implementation of their **PhD supervision training** as a certified component of employment for all supervisors (akin to the University Teaching Qualification).
8. Set up a **Postdoc council** (representatives of Postdocs) that has annual meeting with ILLC management team. Provide training for Postdocs for applying to assistant professorships/lectureships.

10 Addendum self-evaluation: Case studies

10.1 Case Study: Master of Logic

Since its founding, the ILLC has been strongly committed to the education of the next generation of researchers in the areas of Logic, Language, and Computation. A PhD programme has been offered since 1986, when the ILLC started as the *Instituut voor Taal, Logica en Informatie* (ITLI). Since 1995, the ILLC has also offered a Master’s programme in Logic. In 2018, a new undergraduate Minor in Logic & Computation (LoCo) was established to increase the level of preparation of our local undergraduate students in the areas covered by the MSc Logic. In December 2023, 71 PhD candidates, 130 MSc Logic students and 42 Minor LoCo students from 4 continents were studying at the ILLC.

The MSc Logic is a particular point of pride for the institute, producing graduates who go on to make a significant impact in their respective disciplines. The procedures of the MSc Logic, including admissions, selection, supervision, mentoring, and quality control, have been developed and fine-tuned over the years and are working exceptionally well. The programme was evaluated in 2020 as ‘one of the best, if not the best programme on logic in the world,’ with an ‘unparalleled’ curriculum that is ‘outstanding in terms of breadth and depth’.

MSc Logic graduates currently hold faculty positions in universities in the Netherlands (e.g., UvA, VU, Utrecht, Groningen, Nijmegen, Eindhoven), Europe (e.g., ENS Paris, UCL London, Munich, Padova, Tübingen), and outside of Europe (e.g., Stanford, Carnegie Mellon, UCLA, Amherst, UConn, Carleton University, Peking University, Tsinghua University).

The principal aim of the MSc Logic programme is to create an international, interdisciplinary, and research-oriented learning environment in which students are educated as researchers in the areas of Logic, Language, and Computation. During the reporting period, 296 students started the programme (including the Logic Year students), and 204 graduated (this number excludes the Logic Year students). Of the MSc Logic graduates who defended their thesis during the evaluation period, many have entered PhD programmes worldwide. As a test case, we would like to analyse the graduates of the year 2021. In that year, 32 MSc Logic theses were defended (this number does not include the graduates of the Logic Year). Of these graduates, more than 60% (20 students) continued their studies at the PhD level at some of the best schools in the world (e.g., MIT, Carnegie Mellon, University of Southern California, Bern, Toulouse, Bochum, Hamburg, Helsinki, Gothenburg, Groningen, Utrecht, etc).

The clearest indicator of the programme’s success is the exceptionally strong performance of MSc Logic graduates in achieving original research results. This can be observed by studying the research theses written by MSc Logic graduates, but it is most immediately evident from the fact that a lot of MSc Logic theses result in an original research publication. Additionally, several individual and group projects, as well as term papers written for advanced courses, have also led to publications.

Below, we include a selection of the publications that resulted from research produced by MSc Logic students in the years 2018–2019. This list includes journal papers, archival conference proceedings, and workshop papers, all of which are peer-reviewed. Some of these publication venues are among the most prestigious in their respective disciplines. For instance, in recent years, MSc Logic students have published their results in journals such as *the Journal of Symbolic Logic*, *Review of Symbolic Logic*, *Annals of Pure and Applied Logic*, *Journal of Logic and Computation*, *Natural Language and Linguistic Theory*, *Social Choice and Welfare*, and have presented their work at selective conferences such as *AAAI*, *AAMAS*, *CSL*, *WoLLIC*, *CRYPTO*, etc. Besides demonstrating the *interdisciplinarity* of the programme, the publication record of the MSc Logic students also attests to their experience in working in collaborative teams: most publications based on research projects or advanced courses are the joint work of two or more students.

Another indicator of excellence is the fact that several MSc Logic students have won **prizes and awards** for their work. Students from our programme won thesis prizes including the AILA Thesis Award for the best Master’s thesis in Logic by an Italian student (2019 and 2020) and the VvL Thesis Award for the Dutch Logic Association’s best Master’s thesis in Logic and Philosophy of the Exact Sciences (2022 and 2023), among others. Publications co-authored by our students have also won awards, such as the Best Paper Prize at the BlackBoxNLP Workshop at EMNLP and the ESSLLI Student Session, among others.

	2018	2019	2020	2021	2022	2023	
intake	41	54	55	44	49	53	including Logic Year
graduation	36	28	25	32	35	48	excluding Logic Year

Selected publications based on work in 2018-2019

1. **Sam Adam-Day**, Nick Bezhanishvili, David Gabelaia, Vincenzo Marra. *Polyhedral Completeness of Intermediate Logics: the nerve criterion*. The Journal Symbolic Logic, 89(1): 342-382 (2024). Based on thesis work (2019).
2. **Sam Adam-Day**, Nick Bezhanishvili, David Gabelaia, Vincenzo Marra, *The intermediate logic of convex polyhedra*, Annals of Pure and Applied Logic. Accepted for Publications. Based on thesis work (2019).
3. Alexandru Baltag, Nick Bezhanishvili, and **Saúl Fernández González**. *The McKinsey-Tarski Theorem for Topological Evidence Logics*. In R. Iemhoff, M. Moortgat, R. de Queiroz (eds), *Logic, Language, Information, and Computation (WoLLIC 2019)*, LNCS, vol 11541. Springer, 2019. Based on thesis work (2018).
4. Nick Bezhanishvili, Gianluca Grilletti, **Davide Emilio Quadrellaro**. *An Algebraic Approach to Inquisitive and DNA-Logics*. The Review of Symbolic Logic, 15(4): 950-990 (2022). Based on thesis work (2019).
5. Nick Bezhanishvili and **Tim Henke**. *A model-theoretic approach to descriptive general frames: the van Benthem characterization theorem*. Journal of Logic and Computation, 30(7): 1331-1355 (2020). Based on thesis work (2019).
6. **Marco Degano** and Maria Aloni. *Indefinites and free choice. When the past matters*. Natural Language and Linguistic theory, Volume 40, pages 447-484, (2022). Based on thesis work (2019).
7. **Jelle Don**, Serge Fehr, Christian Majenz, and Christian Schaffner. *Security of the Fiat-Shamir Transformation in the Quantum Random-Oracle Model*. In A. Boldyreva, D. Micciancio (eds), *Advances in Cryptology (CRYPTO 2019)*, LNCS, vol 11693. Springer, 2019. Based on thesis work (2018).
8. Mario Giulianelli, **Jacqueline Harding**, Florian Mohnert, Dieuwke Hupkes, and Willem Zuidema. *Under the Hood: Using Diagnostic Classifiers to Investigate and Improve how Language Models Track Agreement Information*. *EMNLP Workshop: BlackboxNLP*, 2018. **Best paper award**. Based on project work (2018).
9. **Jacqueline Harding**. *Proxy selection in transitive proxy voting*. Social Choice Welfare. 58(1): 69-99 (2022). Based on thesis work (2019).
10. **Morwenna Hoeks** and Floris Roelofsen. *Coordinating questions: the scope puzzle*. *Proceedings of Semantics and Linguistic Theory (SALT)*, 2019. Based on thesis work (2018).
11. **Grzegorz Lisowski**, Sylvie Doutre, and Umberto Grandi. *Preventing Manipulation in Aggregating Audiences in Value-Based Argumentation Frameworks*. Proceedings of International Workshop on Systems and Algorithms for Formal Argumentation (SAFA 2018), pp. 48–59, 2018. Based on thesis work (2018).
12. **Gian Carlo Milanese** and Yde Venema. *Closure Ordinals of the Two-Way Modal μ -Calculus*. In R. Iemhoff, M. Moortgat, R. de Queiroz (eds), *Logic, Language, Information, and Computation (WoLLIC 2019)*, LNCS, vol 11541. Springer, 2019. Based on thesis work (2018).
13. **Mathijs Mul** and Willem Zuidema. *Siamese recurrent networks learn first-order logic reasoning and exhibit zero-shot compositional generalization*. ACL 2019, Deep Learning and Formal Languages workshop, 2019. Based on thesis work (2018).
14. **Robert Passmann**. *De Jongh’s Theorem for Intuitionistic Zermelo-Fraenkel Set Theory*. Proceedings of the 28th EACSL Annual Conference on Computer Science Logic (CSL 2020). Based on thesis work (2018).
15. **Mina Young Pedersen**, Sonja Smets, and Thomas Agotnes. *Analyzing Echo Chambers: A Logic of Strong and Weak Ties*. In P. Blackburn et al. (eds), Proceedings of Logic, Rationality, and Interaction (LoRI 2019), LNCS, vol 11813, pp. 183–198, 2019. Based on thesis work (2019).
16. **Yujie Xing** and Raquel Fernández. *Automatic Evaluation of Neural Personality-based Chatbots*. Proceedings of the 11th International Natural Language Generation Conference (INLG), 2018. Based on thesis work (2018).
17. **Zhuoye Zhao**. *Interpreting Intensifiers for Relative Adjectives: Comparing Models and Theories*. In J. Sikos, E. Pacuit (eds), At the Intersection of Language, Logic, and Information (ESSLLI 2018 Student Session), LNCS, vol 11667, pp. 213–224. Springer, 2019. **Best paper award**. Based on project work (2018).
18. **Zhuoye Zhao**. *Bridging Distributivity and Free Choice: The Case of Mandarin Dou*. In Julian J. Schlder, Dean McHugh & Floris Roelofsen (eds) Proceedings of the 22nd Amsterdam Colloquium, 2019, pages 427-436, Based on thesis work (2019).

10.2 Case Study: SignLab

SignLab Amsterdam was initiated in 2020 by Floris Roelofsen, leveraging recent advances in artificial intelligence and computer graphics to add new (computational and applied) dimensions to the long tradition of theoretical sign linguistics in Amsterdam. Its research agenda is not only driven by fundamental scientific and technological challenges but also by urgent societal issues: According to a [recent report of the World Health Organisation](#), around 489 million people have disabling hearing loss of which 70 million are profoundly deaf and have no access to spoken language at all. Also reading is difficult for most deaf people. As a consequence, written texts such as subtitles, websites, and school books can be very difficult to process for deaf children and adults. This leads to unequal opportunities and social exclusion, as witnessed for instance by high rates of [unemployment](#) and [depression](#) among deaf adults.

Scientific and technological gaps to be addressed. The language sciences have focused predominantly on spoken languages. Relatively little is known about how sign languages are used, acquired and processed. Sign language technologies are also highly underdeveloped. For instance, while Google Translate already works for more than 100 spoken languages, it doesn't work for any sign language yet. A major stumbling block, both for scientific and for technological progress, is that available sign language data is lacking both in quantity and in quality. Sign languages do not have a written form. Most available data is therefore in the form of annotated videos, where annotations usually consist in a label for each sign occurring in the video and a translation of each utterance. Putting together such annotated video datasets is highly time-consuming. As a result, existing datasets are relatively small. For instance, the Corpus NGT (Dutch Sign Language) currently contains almost 180.000 annotated signs, while the Corpus Spoken Dutch contains 9.000.000 words with extensive annotations, i.e., 50 times as many, and the latter is just one out of several large Dutch corpora. Moreover, the quality of these datasets for scientific and technological purposes is low. Videos are 2D representations of a 3D reality. Furthermore, they often involve occlusion and motion blur. So, much information is lost in the process of measuring and representing the movement of signers. The field needs a much stronger foundation when it comes to data collection methodologies and data representation formats.

Our approach. SignLab Amsterdam was founded with the general mission to bring together the rich tradition in theoretical sign language linguistics at UvA with current developments in artificial intelligence and computer graphics, to pursue new foundations for scientific inquiry and develop practical applications for sign language users and learners. Research in the lab revolves around four pillars: Methods, Data, Theory and Applications.

Methods. We develop [new methods for data collection, data analysis, and visualisation](#). For instance, we use motion capture equipment to obtain precise 3D measurements of the movements of a signer, and depth-cameras to obtain fine-grained 3D measurements of the signer's facial expressions. We use machine learning methods (e.g. clustering techniques) to analyse such data, and methods from computer graphics and animation (e.g., virtual humans) to visualise the results of our data analyses. In addition, we also develop [methods for data annotation](#) and for [assessing the reliability](#) of such annotations.

Data. We maintain and further develop the [Global Signbank](#) platform, which hosts online lexicons for many sign languages around the world. This platform was initially developed by Radboud University in Nijmegen. Main responsibility for the platform was transferred to us in 2023. We are also substantially extending the [NGT lexicon](#) on Global Signbank, not only adding thousands of signs but also much more detailed information about the form, meaning, and use of each sign (3D recordings, phonological transcriptions, links to the Open Multilingual Wordnet, and example sentences). Besides this large, general-purpose dataset, we are also collecting experimental data on specific constructions in NGT and other sign languages (French, Italian, German, Catalan, Turkish, Russian, and Filipino sign languages).

Theory. We develop formal and computational theories of the syntax and semantics of various constructions in sign languages, including various clause types (especially interrogatives and imperatives), polarity marking, number marking on nominal phrases, and clause embedding. Besides manual signs we also pay particular attention to non-manual features such as facial expressions and body poses, which play a crucial role in many of these constructions. Our theories are often informed by data from several sign languages, and sometimes also aim to elucidate commonalities and differences between signed and spoken languages. The formal and computational models we develop are rooted in strong research traditions in theoretical linguistics at UvA.

Applications. Broadly speaking, we are interested in three application domains: (i) Supporting sign language **learners**; (ii) Improving **access** to information and services for deaf individuals, and (iii) Reducing **communication** barriers between deaf and hearing individuals.

Support for sign language **learners** is urgently needed because most deaf children (95%) have hearing parents, and only around 10% of these parents currently manage to learn sign language, because learning resources are very scarce. As a consequence, during the first years of their lives, many deaf children receive little language input that is accessible to them, which in turn negatively affects linguistic and cognitive development as well as mental well-being throughout the lifespan. Together with [AURIS](#), an organisation which provides education for deaf children and support-programmes for their families, we are currently developing an [app](#) to support parents of deaf children in learning NGT. Moreover, in collaboration with [Prowise](#), we are working on an [online adaptive learning environment](#) for children in primary school to learn the basics of NGT.

As for **accessibility**, we have done a pilot project with [NS](#) (the national railway company) to automatically [translate railway travel announcements into NGT](#) using avatars. We are currently applying for funding, both nationally and at a European level, to work on automatic text-to-sign translation for television broadcasts, in collaboration with [NPO](#), the [Media Innovation Hub](#) and other partners. We are also applying for funding to improve the accessibility of musea, in collaboration with the deaf-lead foundation [In Gebaren](#).

Reducing **communication** barriers is, technologically, by far the most challenging application domain, because communication involves two-way interaction with open-ended vocabulary, complex grammatical constructions, implicit meaning, and reference to the physical context in which the conversation takes place. We do not believe that machine translation can be applied in this domain in the foreseeable future. However, we still think that we can contribute in this area. One major problem is the huge shortage of sign language interpreters. This is partly a logistic problem. Often the need for an interpreter arises on short notice. But interpreters typically need to be booked weeks in advance, and need time to travel from one assignment to the next. We are therefore currently applying for funding to work on a remote interpreter service that makes use of augmented reality technology, in collaboration with [UWV](#) (the government organisation responsible for interpreter services in the Netherlands) and several other partners.

Funding. Since its foundation in 2020, SignLab has been supported by a number of grants:

Grant type	Amount	Applicants	20	21	22	23	24	25	26
ZonMW Covid	25.000	Roelofsen (ILLC)	█						
NWO PhD Hum	300.000	Pfau (ACLC)		█	█	█	█		
NWO Vici	1.500.000	Roelofsen (ILLC)			█	█	█	█	█
NWO Veni	280.000	Oomen (ACLC)							█
PDI-SSH	970.000	Crasborn (RU), Roelofsen (ILLC)				█	█		
UvA LSG	480.000	Roelofsen (ILLC)						█	█
NWO OC	50.000	Sümer (ACLC)							
Google Award	60.000	Roelofsen (ILLC), Nalisnick (IvI)				█			
IXA PoC	50.000	Roelofsen (ILLC)							
UvA IP	400.000	Roelofsen (ILLC), Sümer (ACLC)					█	█	█

In addition, we received 140.000 co-financing from AURIS (a Public Benefit Organisation). This makes the total amount of funds received 4.255.000 euro (of which more than 80% comes from ILLC). Importantly, these funds have not only been used to hire personnel but also to invest in infrastructure for data collection (e.g. 200.000 euros for motion capture equipment and around 30.000 in video recording equipment). To carry out motion capture recordings we make use of the space of the Visualisation Lab at LAB42. For video recordings we make use of a space in the Humanities Labs building, which is shared with two other Humanities Labs.

Staff. SignLab unites researchers across faculties (FNWI (5 fte)) and FGW (7.5 fte) and research institutes (ILLC (10.3 fte, including two permanent staff members, Roelofsen (HL, FNWI) and Trujillo (UD, FNWI)) and ACLC (2.2 fte)). SignLab cherishes **diversity**. Of its 22 members in total, 15 are women, 7 are men, 6 are deaf (4.2 fte at ILLC), and several are members of the LGBT community. The age range is 22-64.

10.3 Case Study: Generative AI

“Generative AI” has become a topic of enormous excitement as well as anxiety in society, especially since the launch of ChatGPT in November 2022. Technological advances of the last few years have made it possible for AI systems to generate text, speech, computer code, mathematical proofs and music at quality levels unimaginable just a few years ago.

What is GenAI? This term has become popular with the rise of Large Language Models and Image Generators, such as those powering ChatGPT, Claude and Gemini, Dalle and Midjourney. GenAI is commonly described as “AI technology that can generate, rather than just analyse”. The term is used for the latest generation of AI systems that produce text, images, speech, music, video, computer code, mathematical proofs or derivations, or descriptions of other scientific objects (such as molecules, plans, designs). Note that generative AI is not a specific field of study, or a recognised subdiscipline of the academic field of AI; the technology builds on advances in subdisciplines such as NLP, CV, ML. These advances include the curation of crucial datasets for training and evaluating machine learning, advances in ML architectures and training regimes, advances in evaluation methodology, and advances in safeguarding the responsible use of this technology. ILLC researchers have, in the years 2018–23, made major contributions in each of these domains.

Contributions to Research. The techniques at the heart of the Generative AI frenzy have been key topics of research at ILLC.²⁵ We therefore highlight here some of the research during the reporting period that falls under that label, as well as our efforts to lend our expertise to societal debates through our public outreach activities. The contributions of ILLC-ers in this domain can be found across the different ‘life stages’ of Generative AI-projects. These stages include (i) *designing* machine learning models, (ii) *evaluating* their performance, (iii) *interpreting* their internal states and (iv) assessing their *societal impact*.

For each of these stages, we can mention many papers. Perhaps the most famous and influential paper during the reporting period has been Voita et al (2019, with first and last author members of ILLC). In this work, the authors adapt an existing attribution technique (LRP) to the Transformer architecture, and report an important discovery: that the majority of ‘work’ in these models is done by a relatively small number of *attention heads*, and that the remaining heads can be pruned with only small loss in accuracy. This work has inspired a lot of follow-up studies into reducing the size of LLMs and other generative AI models, and has accrued more than 1000 citations.

Other impactful papers during the reporting period include Abnar & Zuidema (633 citations), Hupkes, Veldoen & Zuidema (2018; 274 citations) and De Cao, Aziz & Titov (2021; 250 citations) that are all part of the institute’s strong focus on interpreting internal states (stage iii). Papers addressing the other stages include De Cao et al (2019; 277 citations) on designing new ML models, Qi, J., Fernández, R., & Bisazza, A. (2023; outstanding paper award EMNLP, with 1 ILLC-er), on rigorous evaluation, and Van Dis et al (2023; 1020 citations, with two ILLC-ers among the 5-author team) on societal impact.

The impact that ILLC’s work in generative AI has had is reflected in the number of citations that many of the published papers have, but it is also illustrated by the fact that its contributions are acknowledged in many of the headline-grabbing announcements in Artificial Intelligence of the last few years. These include OpenAI’s paper introducing GPT3 (Brown et al., 2020; the model underlying ChatGPT at launch), which includes an evaluation of GPT3 on the dataset from Fernández, Pezzelle et al; Google AI’s paper introducing the Vision Transformer model (Dosovitskiy et al. 2020; the model that revolutionised machine vision), which uses Abnar & Zuidema’s (2020) algorithm to interpret it; Stanford’s hugely influential “Foundation Models” paper (Bommasani et al., 2021), defining the term and a research program around it, and citing Pezzelle, Fernández, Titov, Zuidema, and Aziz; and the HuggingFace/BigScience Workshop’s (2023) paper on BLOOM (the first 175B parameter open source LLM) citing Hupkes et al. (2018).

Contributions to Public Outreach. In addition to pure research, ILLC-ers have also been active lending their expertise to help inform the general public, policy makers, and commercial parties about developments in

²⁵Note that ‘generative AI’ is a label that has only recently become widespread and mostly outside of academia; the research fitting under this label at ILLC has happened mostly but not exclusively within the NLP-DH unit, and has used many different terms including Large Language Models, NLP, AI, structured prediction.

Generative AI, and the risks and opportunities these bring. Our efforts in these domains have been intensified enormously after the launch of ChatGPT, and the hectic societal debate on AI that followed. Some highlights from our public outreach activities include:

- An Afternoon with ChatGPT (January 2023): A two-hour event at Amsterdam Science Park for more than 100 colleagues from the academic community (as well as numerous guest from the private sector), where 6 members of the NLP-group at ILLC (Fernández, Pezzelle, Bloem, Zuidema, Takmaz, Guilianelli) explained the technology behind ChatGPT, as well as its possible uses and misuses. (This event was later repeated at the Faculty of Humanities as “A morning with ChatGPT”).
- An interview on national television with Zuidema in *Nieuwsuur* (December 2022).
- Interviews in and contributions to major newspaper articles (longreads) on Generative AI and Large Language Models by multiple ILLC-ers, including in national newspapers NRC, de Volkskrant and De Correspondent.
- A afternoon-long visit of the committee Digital Transition of the Social-Economic Council (SER), one of the primary advisory councils for the Dutch government, to ILLC (January 2024).
- Two summits with major stakeholders on “Living guidelines for generative AI in research” at the IAS, UvA (April and June 2023); the publication of these guidelines and their motivation in *Nature* (October 2023; with 2 ILLC-ers in a 5 author team) and the adoption of a version of these guidelines by the European Union (March 2024).

In addition to these highlights, members of ILLC have given very many talks on Generative AI developments as well as on their own contributions to these developments to audiences outside of the standard academic audiences. These include talks and meetings at Booking.com, KPN, Van Lanschot-Kempen, Leiden Law academy, KNAW, and events with the city of Amsterdam, Amsterdam Data Science, the Waag Society, and many other institutions and companies.

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10.4 Case Study: ERC Starting Grant Project EXPRESS

The project *From the Expression of Disagreement to New Foundations for Expressivist Semantics* (EXPRESS) ran from February 2018 to January 2023 and was funded by Luca Incurvati’s ERC Starting Grant. Incurvati acted as the project’s PI and the research team also included two postdocs (Giorgio Sbardolini and Julian Schlöder) and a PhD candidate (Lwenn Bussière-Caraes).

The key idea. The EXPRESS project developed a new approach to semantics, *inferential expressivism*, which brings together elements of the expressivist and inferentialist approaches to meaning. Starting from the hypothesis that the meaning of negation is to be explained in terms of its inferential relation to the speech act of rejection, the project developed the strategy of explaining the meaning of an expression in terms of inferences among speech acts of various kind.

Research highlights. The project showed that inferential expressivism solves the Frege–Geach Problem for expressivism in a uniform and comprehensive manner. Moreover, inferential expressivism solves the problem of applicability for inferentialism, in that it can be applied to a wide range of linguistic phenomena. The project demonstrated the fruitfulness of inferential expressivism by using it to provide novel semantic analyses of epistemic modals, moral vocabulary, vague predicates, probability operators, the truth predicate, conditionals and propositional attitude ascriptions.

The project developed inferential expressivist semantics in a new *proof-theoretic multilateral framework*, which uses rules involving formulae prefixed by signs standing for various speech acts. Using this framework, the project provided a uniform solution to puzzles and paradoxes of, among others, truth, epistemic modality, and conditionals. In addition, it provided natural deduction systems for axiomatic theories of truth and modal logics that had thus far resisted axiomatization.

Finally, the project’s key idea led to novel explanations about the presence or otherwise of certain linguistic universals. These explanations were developed by implementing the project’s speech-theoretic framework in a game-theoretic setting and by using computer simulations.

Outputs. EXPRESS members published 22 articles in journals, 5 in collected volumes and 5 in conference proceedings. All journal articles appeared in top generalist philosophy journals (e.g. *Journal of Philosophy*, *Mind*, *Philosophical Quarterly*, and *Philosophical Review*) as well as top specialist journals in logic (*Journal of Philosophical Logic* and *Review of Symbolic Logic*), philosophy of language and semantics (*Semantics & Pragmatics*, *Linguistics and Philosophy*, *Mind and Language*) and philosophy of science (*British Journal for the Philosophy of Science*). In addition, Incurvati and Schlöder published a 350-page monograph on inferential expressivism with Oxford University Press, entitled *Reasoning with Attitude: Foundations and Applications of Inferential Expressivism*. EXPRESS members gave 59 talks at workshops, conferences and seminars in Argentina, Austria, Belgium, Brazil, China, Germany, Greece, Italy, Netherlands, Norway, Poland, Spain, Sweden, UK and USA. In addition, EXPRESS members contributed summer school courses to ESSLLI 2019 in Latvia and YALP 2019 and YALP 2020 in Armenia.

Prizes. Incurvati and Schlöder’s ‘Inferential Expressivism and the Negation Problem’ (*Oxford Studies in Metaethics*), which details the inferential expressivist solution to the Frege–Geach Problem, was awarded the [Marc Sanders Prize in Metaethics](#) (\$ 5,000). Incurvati’s joint article with Florio ‘Metalogic and the Overgeneration Argument’ (*Mind*) was selected among OUP’s Best of Philosophy 2019.

Events and outreach. EXPRESS organised several international events: three two-day workshops (*Bilateral Approaches to Meaning*, *Non-assertoric Speech Acts*, and *Truth, Proof and Communication*, co-organised with the IHPST in Paris); a three-day conference (*Expressivist Approaches to Meaning*); and a regular seminar series (first in Amsterdam, then jointly online with Paris during the lockdown period). Videos of all talks were made available on a dedicated YouTube channel. All activities were advertised on the project’s Twitter account. Reports of project activities and an interview with Incurvati appeared in *The Reasoner*. An article for a general audience by Incurvati applying the project’s findings to issues of sexism in the democratic primaries appeared in *Think: Philosophy for Everyone*.

Placement. Bussière-Caraes completed their PhD in four years and now works as a grant officer at the [NLNet Foundation](#), which provides funding for open internet. Both postdocs secured highly competitive tenure-track positions. Sbardolini is now an Assistant Professor at the ILLC. Schlöder is now an Assistant Professor at the University of Connecticut at Storrs.

10.5 Case Study: Topological Semantics for Modal Logic

Topological Semantics for modal logic has a long tradition at the ILLC, dating back to the work of J. van Benthem and his students since the 1980's on spatial modal logic. This research culminated in the publication of the 'Handbook of Spatial Logic' in 2007. Notably, the chapter 'Modal Logic of Space', co-authored by van Benthem, established the state of the art for modal logic of space for years to come.

New era. A new push began in early 2010's with the hiring of A. Baltag, N. Bezhanishvili, and S. Smets (and later by A. Özgün). They studied the modal logic of space in the setting of topological semantics for modal logic. Currently, the ILLC is one of the central places in this area worldwide. We will identify three main research trends in topological semantics for modal logic at the ILLC.

Mathematical Aspects of Spatial Logic: This work was conducted by N. Bezhanishvili together with his colleagues, notably J. van Mill from the Mathematics Institute of the University of Amsterdam, a renowned expert in general topology. Many important results have been proved, e.g., solving open problems concerning modal logics of topological spaces, such as (locally) compact ones – this resulted in more than a dozen publications in top logic venues. To single out one result, the completeness of the logic of the four-element diamond frame with respect to some normal space was shown to be equivalent to the existence of a measurable cardinal, thus bridging three key areas: modal logic, general topology, and set theory (J. of Symbolic Logic, 2021).

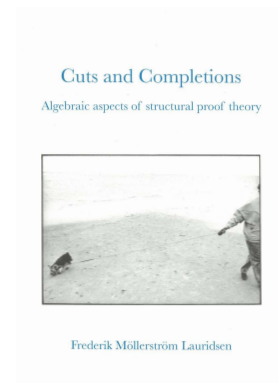
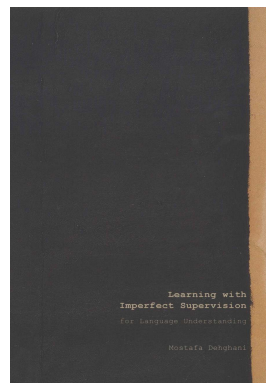
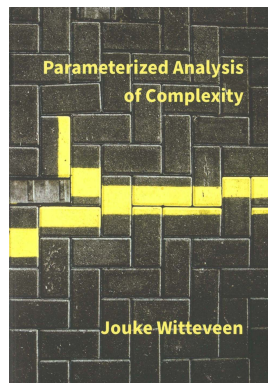
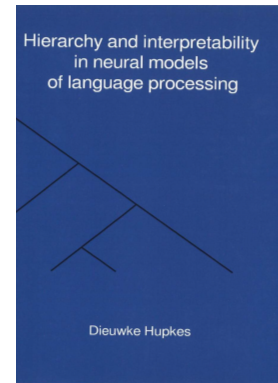
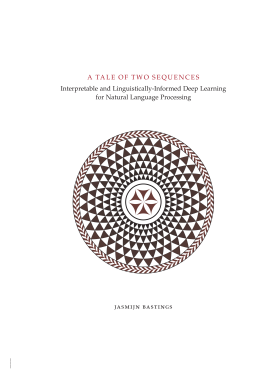
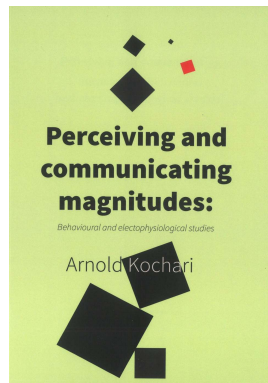
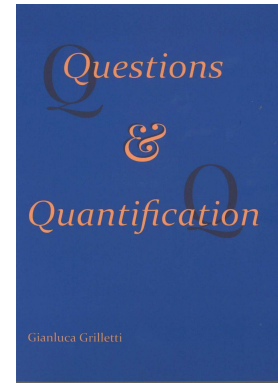
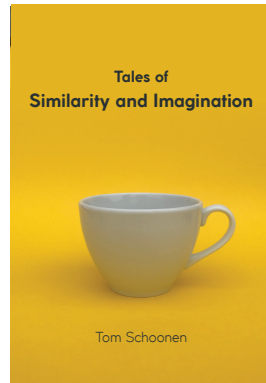
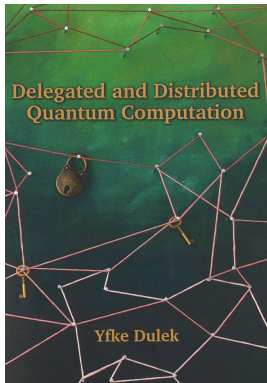
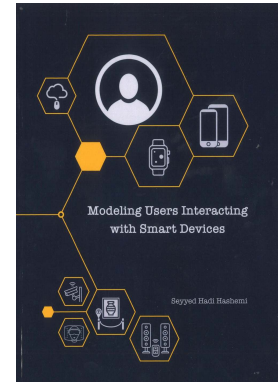
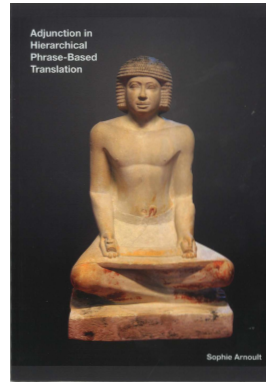
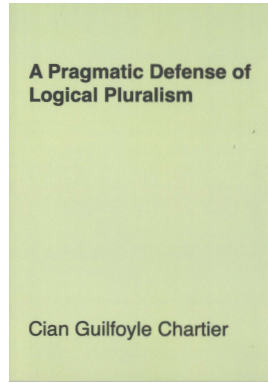
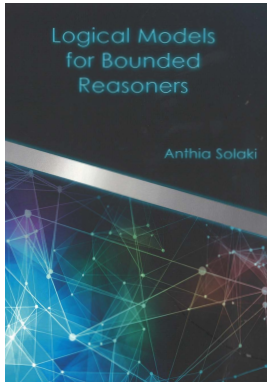
Topological Semantics and Knowledge Representation: A team consisting of A. Baltag, N. Bezhanishvili, A. Özgün and S. Smets developed a new topological semantics for evidence-based justifications, belief, and knowledge (Synthese, 2021). This has become a standard paradigm in this field. In a different development, A. Baltag and N. Bezhanishvili, together with D. Fernandez Duque (from the University of Barcelona), introduced a new spatial modal fixpoint logic based on the Cantor derivative and applied it to the analysis of a famous epistemic puzzle: the *Surprise Exam Paradox*. The paper based on this work received the Best Paper Award at KR 2022 – an important and highly competitive conference on Knowledge Representation. In both cases we see a classical interdisciplinary signature of the ILLC research – a highly technical work on topology and logic is used for analyzing various epistemic phenomena.

Polyhedral Model Checking: N. Bezhanishvili, together with his colleagues from CNR Pisa and Tbilisi, also developed a new subbranch of spatial modal logic: *polyhedral modal logic*. This logic is interpreted on spatially realizable subsets of an Euclidean space called polyhedra (n-dimensional polygons). This work resulted in a number of MSc theses and publications. Moreover, this work also has a direct practical impact through the so-called *polyhedral model checking* (N. Bezhanishvili et al., 2022, 2023). These methods have various potential application in medical imaging, planning of smart cities etc. due to recent developments of 3D scanning and visualisation techniques that exploit mesh processing, as the so-called 3D meshes (building blocks of 3D images) can be easily modelled via 3D polyhedra.

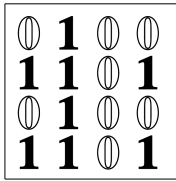
These topics have given rise to established conference series and are now being picked up by new workshops that are satellites of major events in the field. Moreover, on these topics, the researchers at the ILLC teach courses (locally and internationally), supervise students, have visitors, are invited to give guest lectures/PhD committees/grant-evaluations, and have given valorisation activities.

The trend of conferences that established the topic include ToLo (International Workshop on Topological Methods in Logic, co-organized by N. Bezhanishvili), BLAST (the NSF-sponsored conference series on Boolean Algebras, Lattices, Universal Algebra, Set Theory and Topology, co-organized by our international colleagues and collaborators in the USA), and TACL (Topology, Algebra and Categories in Logic, co-organized by our colleagues in Europe), all three series exist for over 15 years. In addition, there are emerging events (typically with ILLC members as invited speakers) that show new connections to different areas in computer science such as [CELT2022. Connections Between Epistemic Logic and Topology](#) (satellite workshop, affiliated to LICS 2022 (Logic in Computer Science) and [Dagstuhl Seminar 23272: Epistemic and Topological Reasoning in Distributed Systems](#).

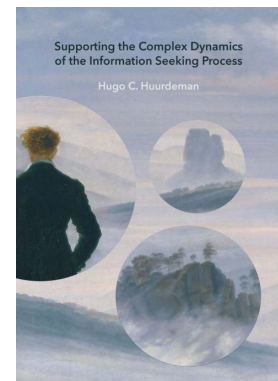
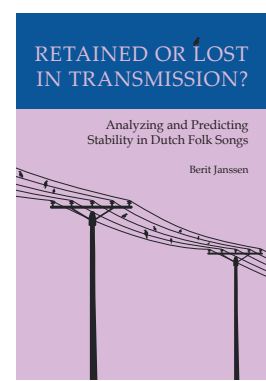
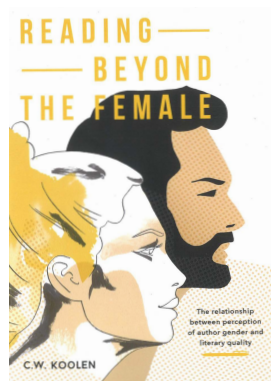
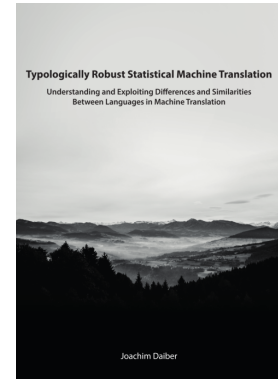
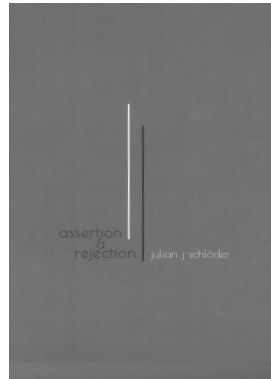
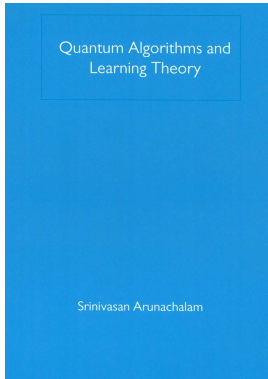
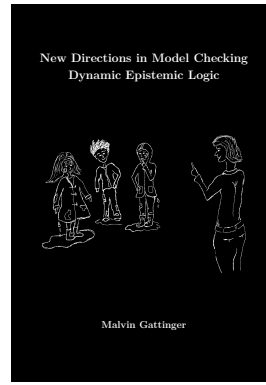
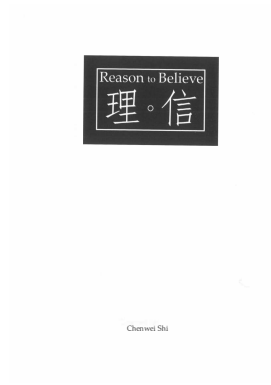
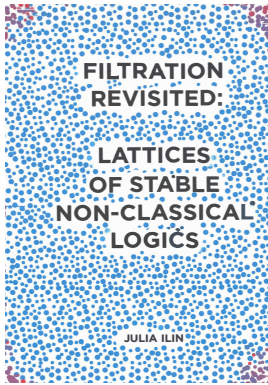
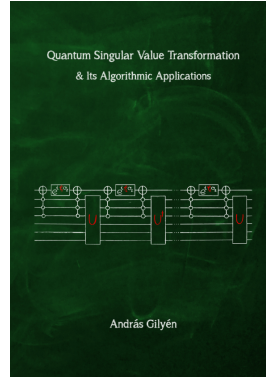
In summary, the ILLC is playing a leading role in theoretical and applied research in topological semantics for modal logic around the globe. Not least due to our input, this area is becoming more and more diverse, encompassing strong mathematical theory with a wide range of applications.

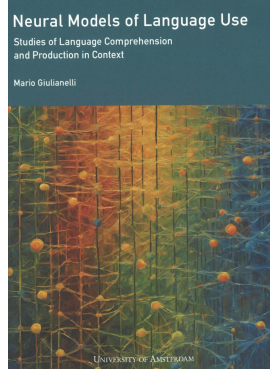
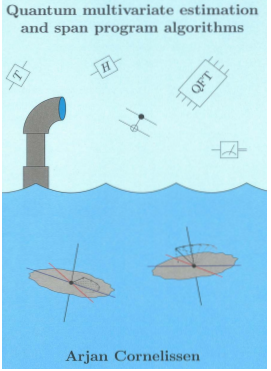
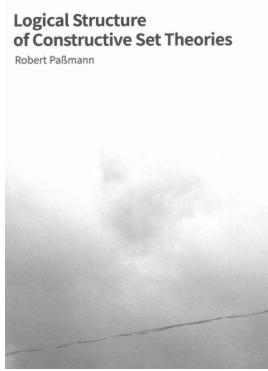
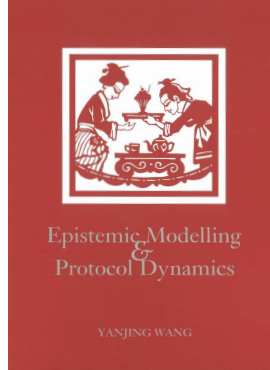
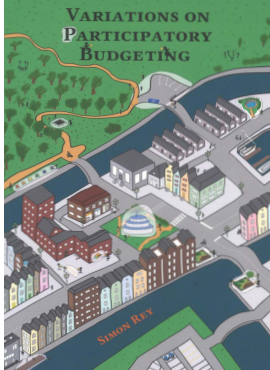
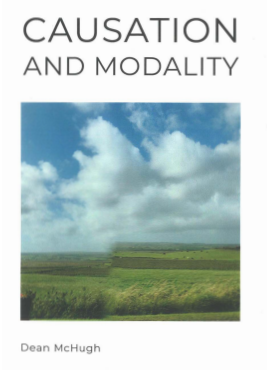
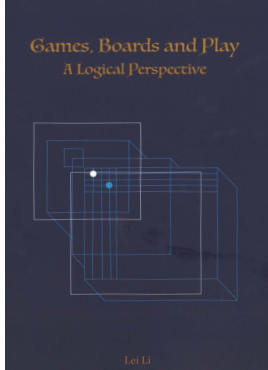
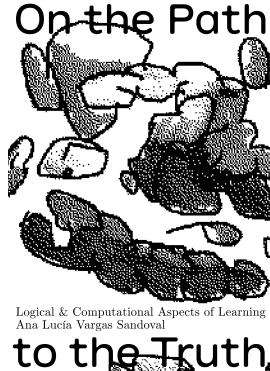
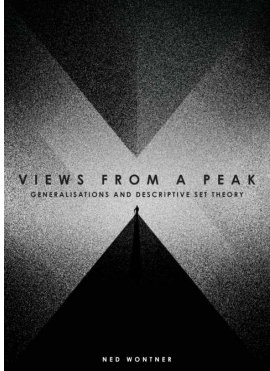
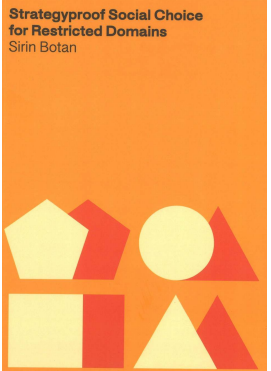
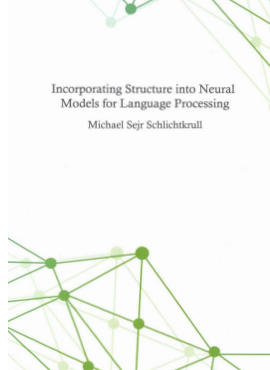
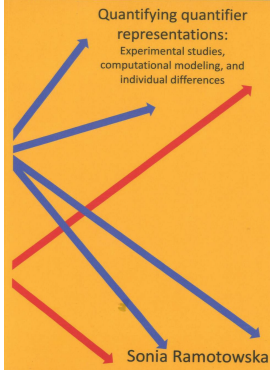
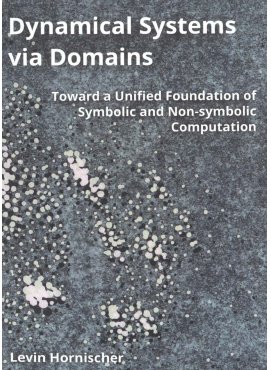
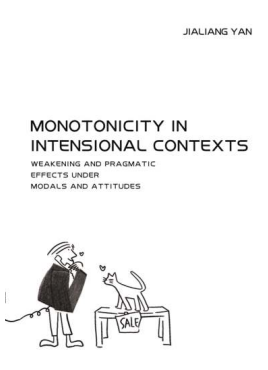


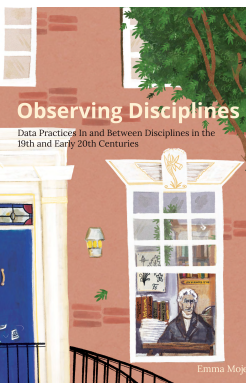
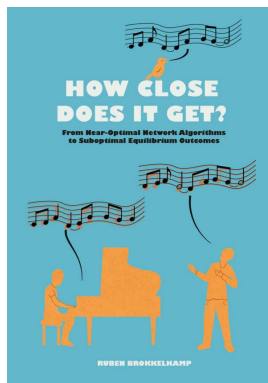
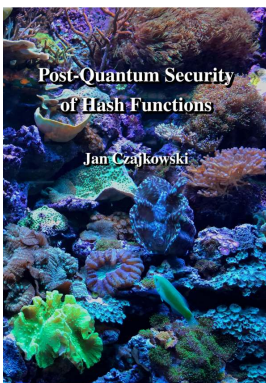
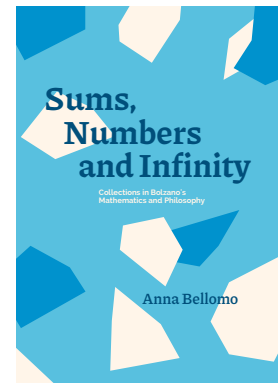
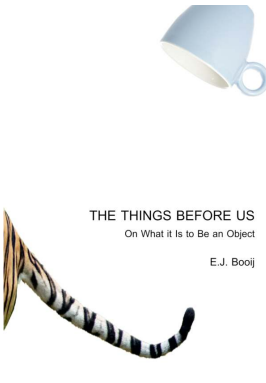
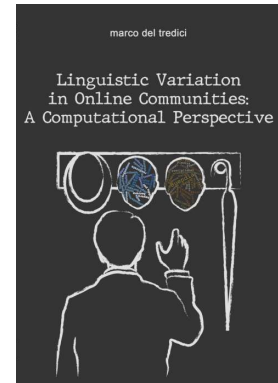
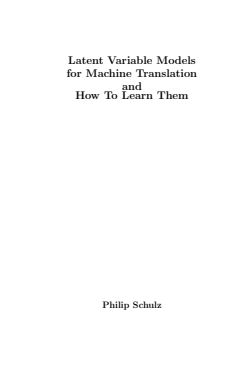
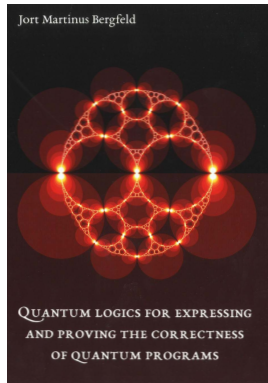
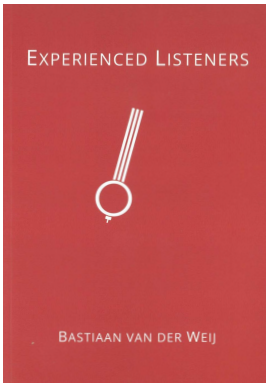
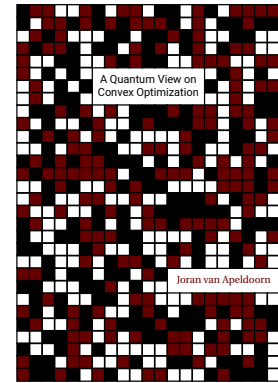
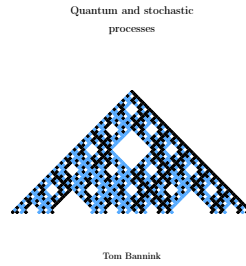
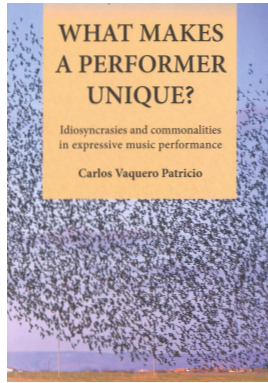
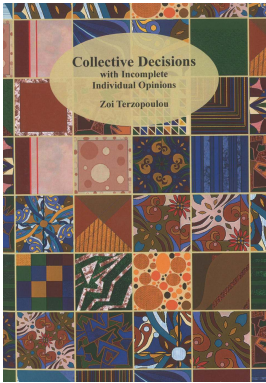
Considerations
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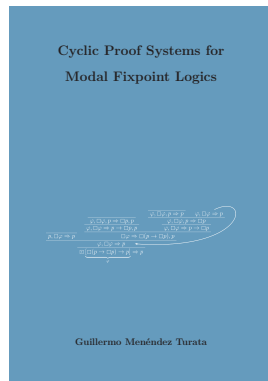
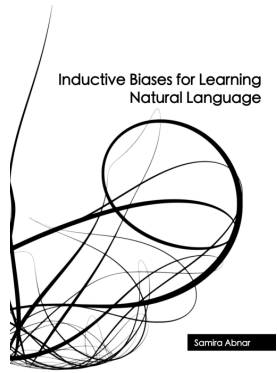


Peter T. S. van der Gulik









11 Appendix

11.1 Composition of the ILLC: Organogram

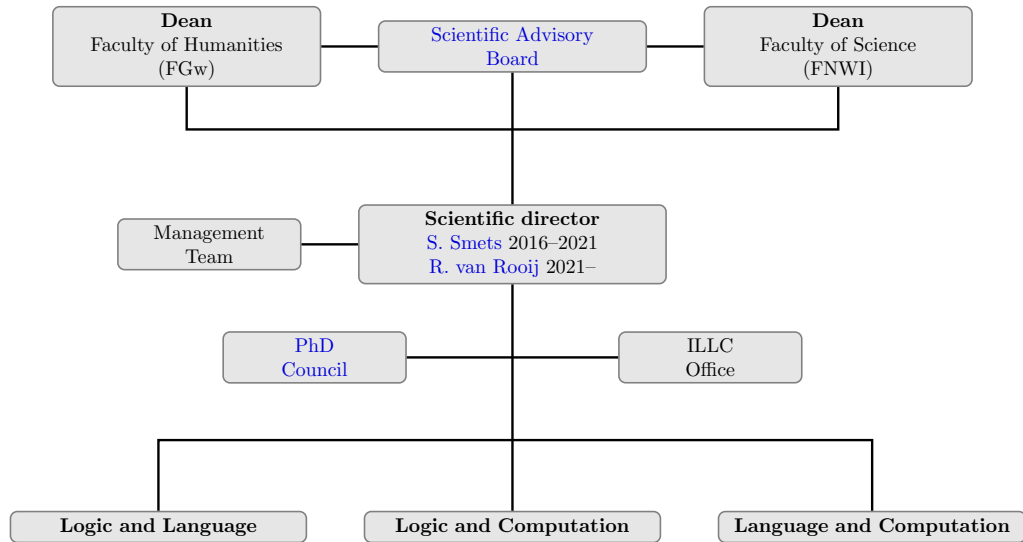


Figure 2: Organisation chart ILLC 2018–2021

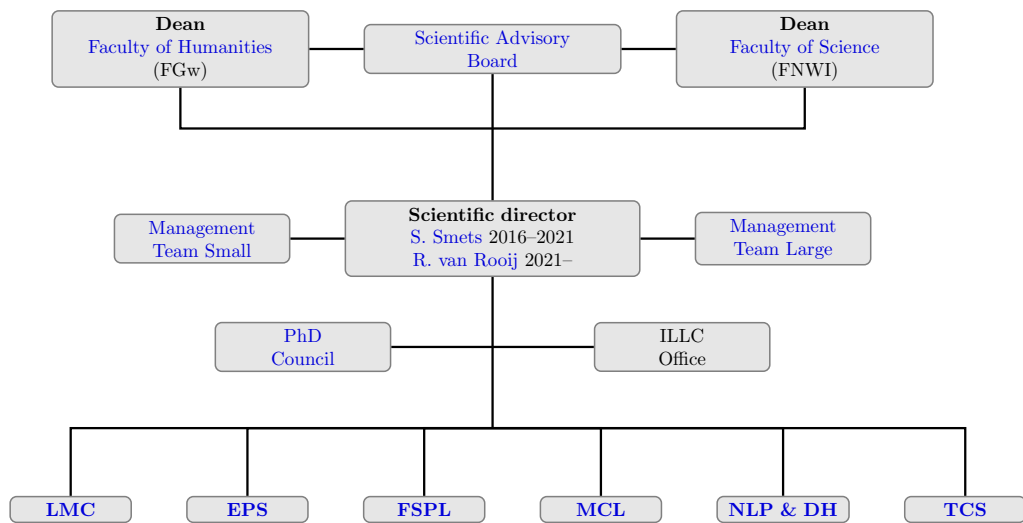


Figure 3: Organisation chart ILLC 2022–2023

11.2 Description of the six new research units

Mathematical and Computational Logic (MCL). The unit *Mathematical and Computational Logic* focuses on gaining a deeper understanding of the nature of information and the processes of reasoning and computation. Researchers in the unit are internationally recognized as leading figures on foundational issues in mathematics, theoretical computer science and AI. Foremost, the unit builds on a strong tradition of research in logic in the Netherlands, going back to the work of Brouwer, Heyting and Beth. While being best known for our work in intuitionistic and modal logic, we cover most of the classical areas of mathematical logic such as set theory, computability theory, category theory, proof theory and algebraic logic. In theoretical

computer science, the unit is famous for its work on coalgebraic and fixpoint logics, as well as type theory and the computational content of proofs, and in AI, for its contribution to the fields of multi-agent systems, the dynamics of information and formal learning theory. Through its foundational work the unit contributes to neighboring disciplines ranging from formal epistemology, decision theory, game theory to cognitive science.

Theoretical Computer Science (TCS). In theoretical computer science, our research is characterised by a focus on fundamental questions regarding the design and analysis of algorithms.

We investigate problems motivated by applications in physics, economics, and AI. Specifically, at the interface with physics, we conduct research in quantum computing and quantum information. At the interface with economics, we are active in the fields of algorithmic game theory and computational social choice. Finally, at the interface with AI, we work on topics in knowledge representation, planning and multiagent systems.

Transcending this diversity of research directions is a shared reliance on formal tools, including techniques originating in computational logic, complexity theory, information theory, linear algebra, combinatorics, and discrete mathematics more generally.

Formal Semantics & Philosophical Logic (FSPL). The research focus of the unit is the study, through the application of formal tools, of information transfer and communication through meaningful language use, as well as of key philosophical problems. The unit brings together researchers who are a leading force within formal semantics and pragmatics and within philosophical logic. Researchers in this Unit investigate linguistic phenomena such as epistemic modals, conditionals, indexicals, quantifiers, free choice, rejection and questions as well as philosophical concepts such as vagueness, truth, consequence and conceivability. A distinctive feature of the unit is the plurality of methods used to pursue the research objectives. Members of the unit draw on a variety of logical tools (different logics such as modal, many-valued, non-monotonic, supervaluationist, dynamic and inquisitive logics, using both model-theoretic and proof-theoretic approaches) and other formal tools (causal inference, game theory, computer simulations and other computational tools), and combine these tools with philosophical reflection and linguistic analysis.

Epistemology & Philosophy of Science (EPS). Researchers in this unit focus on the use of computational models and analytic methods coming from e.g., logic, probability theory and game theory to address a number of topics in formal epistemology and in the methodology and philosophy of science broadly conceived.

Within epistemology, our team plays a leading role in the design and use of epistemic and doxastic logics, with highlights on dynamic interactive belief revision and applications of logic to opinion diffusion in social networks. The team's study of rational agency draws connections to work on multi-agent systems in AI, as well as to investigations on the theory of mind in the cognitive sciences.

Within the methodology and philosophy of science, the team focuses inter alia on scientific explanation, scientific modelling and (other) scientific inference strategies, and methods applied to areas such as AI, Mathematics, Quantum Physics, Cognitive Science, Life Science, Social Sciences and the Engineering Sciences. Core topics range from function modelling in the engineering sciences to models of responsible agency in philosophy of AI as well as the explanatory power of scientific theories and explanations and a logic-based analysis of quantum information.

The unit is a key player in the newly developed area of computational philosophy, conceived in two manners: the application of data-driven, computational methods from AI in the investigation of the development of scientific ideas (concept drift), in particular ideas from logic and philosophy, and methodological reflections on computational linguistics and natural language processing seen as a new research domain in the philosophy of science.

Natural Language Processing & Digital Humanities (NLP&DH). Research in the Natural Language Processing and Digital Humanities unit focuses on automated analysis, interpretation and generation of human language and their extension towards language technology as well as their application to other humanities disciplines such as history, art, music and literature. Our work encompasses a range of topics within natural language processing (NLP) and Information Retrieval, such as syntactic parsing, computational semantics and pragmatics, discourse processing, dialogue modelling, machine translation, multilingual NLP, visually grounded

language, as well as applications to information access, search and recommendation. Our interdisciplinary focus, incorporating insights from linguistics, cognitive science, psychology and machine learning, gives our group's research a unique profile, having led to numerous distinctive contributions over four decades. Whilst well-known for its influential research in the areas of statistical parsing, syntax based machine translation and semantic role labeling, recently the group has pioneered methods for interpretability of neural models, graph neural networks for NLP and few-shot learning applied to NLP tasks. Besides developing NLP models, another prominent research direction focuses on the development of societally-oriented and responsible NLP technology, as well as applications in computational literary studies, digital history, computational musicology and computational social science. To this end, the group has explored how statistical and neural models can retrieve information from text to help answer questions in the humanities, ranging from history to philosophy, and aid large-scale data-driven analysis of cultural artifacts.

Language & Music Cognition (LMC). Humans exhibit two important capacities, that for language and that for music, each of which can be seen as natural, spontaneously developing sets of traits that are based on and constrained by our cognitive abilities and underlying biology. One important line of research in Language and Music Cognition focuses specifically on *musicality*: identifying the cognitive traits that give rise to our ability to appreciate music. The unit explores the learnability and *evolution of language*, in particular how our propensity to use complex expressions to convey complex meanings came about. *Complexity* itself is a priority as a means of understanding core cognitive abilities such as language learning, comprehension, or reasoning. Other work explores the cognitive boundaries between language and music, for example, delineating the conditions under which the *speech-to-song* illusion can occur. *Machine learning and representations* are key to several unit member's methodologies, for example, measuring the characteristics of 'catchy' music, modelling visually grounded language use, or explaining linguistic universals. The group works with diverse and multimodal data, both symbolic and sub-symbolic, correlational and experimental, audio/video and text.

11.3 Research Staff

11.3.1 Research Staff: Institute Level

Research staff at institute level		2018	2019	2020	2021	2022	2023
Full Professors	FGw	5.1	5.0	5.0	3.9	3.9	4.0
	FNWI	4.4	4.5	5.4	5.5	6.2	7.2
	ILLC	9.5	9.5	10.4	9.4	10.1	11.2
Associate Professors	FGw	3.7	3.3	3.7	4.1	3.7	3.0
	FNWI	6.2	7.5	7.2	8.6	8.8	7.6
	ILLC	9.9	10.8	10.8	12.7	12.5	10.6
Assistant Professors	FGw	9.3	10.5	10.2	11.0	13.0	15.4
	FNWI	6.5	7.1	7.7	7.5	8.7	10.7
	ILLC	15.8	17.6	17.9	18.5	21.7	26.1
Postdocs	FGw	10.7	10.8	9.6	8.7	7.5	8.2
	FNWI	15.1	10.7	10.9	12.0	14.8	16.0
	ILLC	25.8	21.5	20.5	20.7	22.3	24.2
PhD Candidates	FGw	16.0	15.1	13.4	12.2	9.6	14.2
	FNWI	25.9	30.4	31.2	29.3	32.6	35.4
	ILLC	41.9	45.5	44.6	41.5	42.2	49.6
Research support staff	FGw	2.6	3.8	7.9	6.5	4.2	2.9
	FNWI	0.7	0.0	1.5	2.3	0.2	2.1
	ILLC	3.3	3.8	9.4	8.8	4.4	5.0
Total research staff		106.2	108.7	113.6	111.6	113.2	126.7
Visiting fellows	FGw	0.4	1.0	0.7	0.4	2.4	1.2
	FNWI	2.7	3.2	3.1	4.1	5.6	8.4
	ILLC	3.1	4.2	3.8	4.5	8.0	9.6
Teaching Staff	FGw	1.1	1.8	1.8	2.1	1.4	1.2
	FNWI	0.1	0.0	0.3	0.2	0.9	0.7
	ILLC	1.2	1.8	2.1	2.3	2.3	1.9
Support staff (ILLC Office)	ILLC	5.4	5.6	5.6	5.9	5.9	5.0
Total staff		115.9	120.3	125.1	124.3	129.4	143.2

Table 5: Research staff overview (in fte)

11.3.2 Research Staff: Per Programme (2018–2021)

Programme		2018	2019	2020	2021
Logic and Language	Full Professors	4.5	4.5	4.5	3.4
	Associate Professors	2.3	2.4	2.8	3.5
	Assistant Professors	6.0	7.6	6.9	8.4
	Postdocs	11.9	12.7	12.1	11.1
	PhD candidates	13.5	12.8	11.5	11.2
	Research support staff	2.5	3.8	6.0	5.2
	Total LoLa	40.7	43.7	43.8	42.8
Logic and Computation	Full Professors	2.0	2.0	2.9	3.0
	Associate Professors	5.0	5.4	4.9	5.4
	Assistant Professors	3.3	3.5	4.2	4.0
	Postdocs	5.0	3.3	3.5	5.1
	PhD candidates	13.6	17.3	19.8	18.2
	Research support staff	0.2	0	0	0.3
	Total LoCo	29.0	31.5	35.2	35.9
Language and Computation	Full Professors	3.0	3.0	3.0	3.0
	Associate Professors	2.7	3.0	3.2	3.9
	Assistant Professors	6.5	6.6	6.8	6.1
	Postdocs	8.9	5.5	5.0	4.5
	PhD candidates	12.6	13.9	12.9	12.6
	Research support staff	0.2	0	2.7	2.4
	Total LaCo	5.6	32.0	33.5	32.4
ILLC Total Research		103.5	107.2	112.5	111.1

Table 6: Research staff per programme

11.3.3 Research Staff: Per Unit (2021–2023)

Unit		2022	2023
Mathematical and Computational Logic	Full professors	1.1	1.1
	Associate professors	2.4	2.5
	Assistant professors	2.0	1.4
	Postdocs	3.4	3.0
	PhD candidates	6.4	6.6
	Research support staff	0.0	0.0
	Total MCL	15.3	14.7

Table 7: Research staff MCL

Unit		2022	2023
Theoretical Computer Science	Full professors	1.8	1.8
	Associate professors	1.9	1.4
	Assistant professors	3.0	4.0
	Postdocs	3.9	3.0
	PhD candidates	7.6	6.2
	Research support staff	0.2	0.7
	Total TCS	18.4	17.1

Table 8: Research staff TCS

Unit		2022	2023
Natural Language Processing & Digital Humanities	Full professors	2.8	3.0
	Associate professors	3.5	3.4
	Assistant professors	6.3	8.4
	Postdocs	2.8	5.2
	PhD candidates	17.7	20.0
	Research support staff	1.9	1.2
	Total NLP & DH	35.0	41.1

Table 9: Research staff NLP & DH

Unit		2022	2023
Language and Music Cognition	Full professors	1.0	1.0
	Associate professors	0.8	1.0
	Assistant professors	2.8	3.8
	Postdocs	3.2	2.5
	PhD candidates	4.3	2.8
	Research support staff	1.0	1.3
	Total LMC	13.2	12.4

Table 10: Research staff LMC

Unit		2022	2023
Epistemology and Philosophy of Science	Full professors	2.2	2.4
	Associate professors	0.0	0.0
	Assistant professors	6.2	6.5
	Postdocs	1.3	2.3
	PhD candidates	4.1	5.8
	Research support staff	1.3	0.5
	Total EPS	15.1	17.4

Table 11: Research staff EPS

Unit		2022	2023
Formal Semantics and Philosophy of Logic	Full professors	1.2	2.0
	Associate professors	3.8	2.3
	Assistant professors	1.5	2.4
	Postdocs	7.8	8.4
	PhD candidates	6.1	9.1
	Research support staff	0.0	0.9
	Total FSPL	20.4	25.1

Table 12: Research staff FSPL

Unit		2022	2023
Institute for Logic Language and Computation	Full professors	10.1	11.3
	Associate professors	12.5	10.6
	Assistant professors	21.7	26.4
	Postdocs	22.3	24.3
	PhD candidates	46.2	50.6
	Research support staff	4.4	4.5
	Total ILLC	117.1	127.7

Table 13: Research staff ILLC

11.4 Financing

11.4.1 Funding and Expenditure: Institute Level

	2018		2019		2020		2021		2022		2023	
	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%
Funding												
Direct funding	46.4	43%	47.0	42%	47.4	40%	50.5	42%	58.3	46%	61.5	43%
Research grants	38.9	36%	34.7	31%	36.8	31%	34.8	29%	32.7	26%	38.5	27%
Contract Research	14.4	13%	20.8	18%	25.4	22%	20.6	17%	12.7	10%	12.7	9%
Other	9.4	8%	10.0	9%	7.7	7%	14.4	12%	23.7	18%	29.5	21%
Total	109.1		112.5		117.3		120.3		127.4		142.2	
Expenditure												
Personnel costs	5,901	69%	6,277	69%	6,879	69%	6,771	70%	6,354	70%	7,826	72%
Other	2,690	31%	2,839	31%	2,930	31%	2,883	30%	2,697	30%	3,032	28%
Total	8,590		9,115		9,909		9,654		9,051		10,858	

Table 14: Funding ILLC

11.4.2 Funding and Expenditure: Per Faculty

		2018		2019		2020		2021		2022		2023	
Funding institute	level	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%	<i>fte</i>	%
Direct Funding	FGw	18.3	39%	18.7	%	18.3	%	19.2	%	23.1	%	27.0	%
	FNWI	28.1	61%	28.3	%	29.1	%	31.2	%	35.2	%	34.6	%
	ILLC	46.4	%	47.0	%	47.4	%	50.4	%	58.3	%	61.4	%
Research grants	FGw	13.0	%	11.9	%	16.7	%	14.7	%	11.3	%	11.2	%
	FNWI	25.9	%	22.8	%	20.1	%	20.1	%	21.4	%	21.4	%
	ILLC	38.9	%	34.7	%	36.8	%	34.8	%	32.7	%	32.6	%
Contract research	FGw	10.7	%	14.4	%	13.5	%	9.9	%	4.6	%	2.7	%
	FNWI	3.7	%	6.4	%	11.9	%	10.7	%	8.1	%	9.1	%
	ILLC	14.4	%	20.8	%	25.4	%	20.6	%	12.7	%	11.8	%
Other	FGw	2.5	%	2.3	%	1.2	%	3.4	%	5.8	%	9.0	%
	FNWI	6.9	%	7.7	%	6.6	%	11.0	%	18.0	%	20.4	%
	ILLC	9.4	%	10.0	%	7.8	%	14.4	%	23.8	%	29.4	%
Total	FGw	44.5	%	47.3	%	49.6	%	47.3	%	44.9	%	49.8	%
	FNWI	64.4	%	65.2	%	67.6	%	73.0	%	82.7	%	91.3	%
	ILLC	108.9		122.5		117.2		120.3		127.6		141.1	
Expenditure		k€	%	k€	%	k€	%	k€	%	k€	%	k€	%
Personnel costs	FGw	1,967	33%	2,412	38%	2,677	39%	2,440	36%	1,999	31%	2,398	31%
	FNWI	3,934	67%	3,865	62%	4,201	61%	4,331	64%	4,356	69%	5,428	69%
	ILLC	5,900		6,275		6,877		6,771		6,355		7,826	
Other	FGw	1,471	55%	1,567	55%	1,618	55%	1,521	53%	1,242	46%	1,538	51%
	FNWI	1,212	45%	1,272	45%	1,213	45%	1,361	47%	1,455	54%	1,494	49%
	ILLC	2,690		2,839		2,930		2,883		2,697		3,032	
Total	FGw	3,438	40%	3,978	44%	4,295	44%	3,961	41%	3,241	36%	3,936	36%
	FNWI	5,153	60%	5,137	56%	5,513	56%	5,691	59%	5,810	64%	6,922	64%
	ILLC	8,590		9,115		9,809		9,654		9,051		10,858	

Table 15: Sources of research funding per faculty

11.4.3 Funding: Per Programme

Programme	Funding	2018	2019	2020	2021
Logic and Language	Direct funding	11.6	11.6	13.0	13.6
	Research grants	17.6	11.8	7.6	3.3
	Contract research	0.0	3.7	8.7	9.2
	Other	0.5	1.6	1.4	5.9
	Total LoLa	29.8	28.7	30.1	31.4
Logic and Computation	Direct funding	15.4	14.6	14.3	13.9
	Research grants	6.5	9.3	13.5	14.9
	Contract research	3.9	3.4	3.4	3.6
	Other	4.9	4.6	3.4	3.3
	Total LoCo	30.6	31.9	34.5	35.3
Language and Computation	Direct funding	13.5	15.2	14.5	16.8
	Research grants	14.8	13.6	15.7	16.7
	Contract research	10.5	13.7	13.3	7.8
	Other	3.9	3.8	2.8	5.1
	Total LaCo	42.7	46.3	46.3	46.4
ILLC	Total ILLC	103.1	106.7	110.9	113.1

Table 16: Sources of research funding: programme level

11.4.4 Funding: Per Unit

Programme	Funding	2022	2023
Mathematical and Computational Logic	Direct funding	8.4	8.2
	Research grants	3.2	3.6
	Contract research	1.6	1.5
	Other	2.6	2.1
	Total MCL	15.7	15.3
Theoretical Computer Science	Direct funding	6.9	6.3
	Research grants	8.9	8.8
	Contract research	0.3	0.5
	Other	1.9	1.6
	Total TCS	18.0	17.2
Natural Language Processing & Digital Humanities	Direct funding	14.6	15.9
	Research grants	4.4	6.5
	Contract research	5.9	6.2
	Other	11.0	13.8
	Total NLP & DH	35.8	42.4
Language and Music Cognition	Direct funding	5.5	5.5
	Research grants	3.4	3.4
	Contract research	0.9	0.6
	Other	2.4	4.0
	Total LMC	12.2	13.4
Epistemology and Philosophy of Science	Direct funding	8.8	9.6
	Research grants	4.3	3.3
	Contract research	0.0	1.5
	Other	2.8	5.0
	Total EPS	15.9	19.4
Formal Semantics and Philosophy of Logic	Direct funding	8.4	10.6
	Research grants	8.5	12.7
	Contract research	4.1	1.5
	Other	2.4	3.0
	Total FSPL	23.3	28.0
ILLC	Total ILLC	120.9	135.7

Table 17: Sources of research funding: unit level

11.4.5 Funding: Earning Capacity

	2018		2019		2020		2021		2022		2023		Total	
	k€	#	k€	#	k€	#	k€	#	k€	#	k€	#	k€	#
Grants awarded to individuals	3,781	4	1,568	5	0	0	2,590	8	4,488	7	600	2	13,027	26
Non-personal academic grants	2,003	4	2,041	10	2,795	16	2,476	9	5,040	16	2,960	9	17,314	64
Contract with industry	0	0	30	1	0	0	520	2	0	0	27	1	577	4
<i>Total</i>	5,783	8	3,639	16	2,795	16	5,587	19	9,528	23	3,587	12	30,919	94

Table 18: Earning Capacity: Research grants ILLC

	2018		2019		2020		2021		2022		2023		Total		
	k€	#	k€	#	k€	#	k€	#	k€	#	k€	#	k€	#	
FGw	Non-personal academic grants	525	2	699	2	1,084	8	1,800	6	1,483	3	1,537	2	7,127	23
	Grants awarded to individuals	281	2	36	1	0	0	254	1	1,815	3	0	0	2,385	7
	<i>Total</i>	806	4	735	3	1,084	8	2,054	7	3,298	6	1,537	2	9,512	30
FNWI	Contract with Industry	0	0	30	1	0	0	520	2	0	0	27	1	577	4
	Non-personal academic grants	1,478	3	1,341	8	1,711	8	677	3	3,557	12	1,422	7	10,187	41
	Grants awarded to individuals	3,500	2	1,532	4	0	0	2,336	7	2,674	4	600	2	10,642	19
<i>Total</i>	4,978	5	2,904	13	1,711	8	3,533	12	6,231	16	2,050	10	21,407	64	

Table 19: Earning capacity per faculty

11.4.6 Funding: Overview of cooperation with industrial and societal partners

In addition to partners that directly fund ILLC research projects, ILLC members have collaborated with a wide range of industrial and societal partners in numerous other collaborative projects. We mention here the following list: [European Citizen Science Association](#) (via project [SOLARIS](#)), [Mollie](#), [ING](#), [Imprima](#) and [Zuva.ai](#) (via project [AI4FinTech](#)); [AIGent](#), [ATHORA](#), [AURUS](#), [City of Amsterdam](#), [IDfuse](#), [Koninklijke Bibliotheek](#), [KPN](#), [Nederlands Gebarententrum](#), [NPO](#), [NS](#), [RijksMuseum-Amsterdam](#), [SLO](#), [Sound and Vision](#), [Textkernel](#), [TNO](#) (via project [LSG](#)); [Unlabel](#) and [NAVER LABS Europe](#) (via project [UTTER](#)); [KPN](#), [AI Gent](#), [Chordify](#), [Deloitte](#), [Flood Tags](#), [Global Textware](#), [Textkernel](#), [Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek \(TNO\)](#) (via project [InDeep](#)); [IBM](#), [Sound and Vision](#), [RAI](#), [Deutsche Welle](#) (via project [AI for Media and Society](#)); [Spinqe](#), [TinQwise](#), [NotuBiz](#), [Open State Foundation](#), [Gridline](#), [Stadsarchief Amsterdam](#) [KNAW / Huygens-instituut](#), [KB](#) (via project [ACCESS](#)), [The iSchool Organisation](#), [DARIAH-EU](#), [Europeana](#), [Amsterdam Time Machine](#), [National Library of France](#) (via project [DiMPAH](#)); [BBC](#) (via project [GoURMET](#)); [Gemeente Amsterdam Stadsarchief](#), [Huygens Institute](#), [Lab 1100](#) (via project [Golden Agents](#)); [Allard Pierson Museum](#), [Badisches Landes Museum](#) (via the [CUE](#) project); [Rathenau Institute](#), [Raad voor Openbaar Bestuur](#), [Dutch Ministry of Foreign Affairs](#), [Dutch Ministry of Justice and Security](#), [Dutch Ministry of Infrastructure and Water Management](#), [The Dutch Banking Association](#), [De Nederlandse Bank](#), [ABN-AMRO](#), [Digital Power](#), [Platform for Informatie Samenleving](#), [Quantum Delta](#), [Quantum Safe Canada](#) (via the [Quantum Impact on Societal Security](#) project)

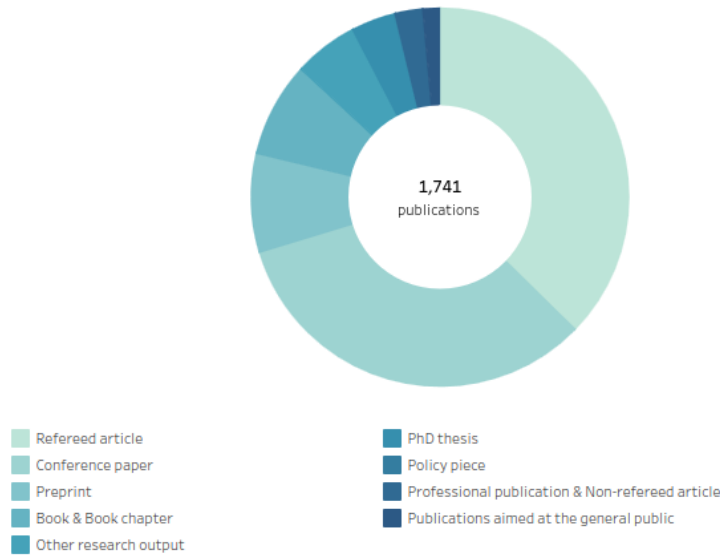
11.4.7 Grants awarded in competitions and which have funded scientific positions

Applicant (PI)	Faculty	Grant organisation	Grant programme	Year granted	Amount (€)
Kamps, J.	FGW	NWO	Creative cities	2018	525,000
Schindler, T.	FGW	Horizon 2020	Marie Curie Individual Fellowship	2018	117,300
Endriss, U.	FNWI	NWO	Vici	2018	1,500,000
Schaffner, C.	FNWI	Quantum Software Consortium	Internal call	2018	254,102
McHugh, D.M.	FGW	NWO	PhD in Humanities	2018	163,205
Ferreira Aziz, W.	FNWI	ERC	H2020-ICT	2018	490,568
Fernández, R.	FNWI	ERC	Consolidator	2018	2,000,000
Venema, Y.	FNWI	NWO	TOP1	2018	732,831
Calixto, I.	FNWI	H2020	Marie Curie Global Fellowship	2019	232,394
Ozols, M.	FNWI	NWO	Vidi	2019	800,000
Amanatidis, G.	FNWI	NWO	Veni	2019	250,000
Haan, R. de	FNWI	NWO	Veni	2019	249,970
Muskens, R.A.	FNWI	NWO	Open Competition	2019	770,850
Rooij, R.A.M. van	FNWI	NWO	Open Competition	2019	513,572
Schulz, K.	FGW	NWO	Open Competition for Digitalisation	2019	658,980
Walter, M.	FNWI	NWO	Open Competition ENW Klein	2020	100,000
Honing, H.J.	FGW	Universiteit van Amsterdam	ABC project grant 2020	2020	249,480
Zuidema, W.H.	FNWI	NWO	NWA-ORC	2020	618,344
Fernández, R.	FNWI	ELLIS Amsterdam	PhD grant	2021	355,972
Ferreira Aziz, W.	FNWI	Booking.com	Research grant	2021	354,308
Choenni, R.M.V.K.	FNWI	Google	PhD Fellowship	2021	187,993
Cate, B.D. ten	FNWI	H2020	Marie Skłodowska-Curie Individual Fellowship	2021	175,572
Kappé, T.W.J.	FNWI	H2020	Marie Skłodowska-Curie Individual Fellowship	2021	175,572
Roelofsen, F.	FNWI	NWO	Vici	2021	1,500,000
Törnberg, K.P.	FNWI	NWO	Veni	2021	121,192
Honing, H.J.	FGW	NWO	Open Competition	2021	750,000
Maly, J.F.	FNWI	FWF	Erwin Schrödinger Fellowship	2021	75,890
Afshari, B.	FNWI	NWO	Open Competition Domain Science - M	2021	270,970
Honing, H.J.	FGW	PDI-SSH	Digital Infrastructure	2021	437,965
Roelofsen, F.	FGW	PDI-SSH	Digital Infrastructure 2021	2021	473,740
Fernández, R.	FNWI	DFG	Walter Benjamin Programme	2022	67,000
Fernández, R.	FNWI	Language In Interaction	Call postdoc positions	2022	170,513
Buhrman, H.M.	FNWI	IXA	Proof of Concept	2022	100,000
Berg, B. van den	FNWI	NWO	Open Competition Science M 2	2022	271,828
Titov, I.A.	FNWI	NWO	Vici	2022	1,498,868
Fernández, R.	FNWI	NWO	NWA-ORC	2022	258,328
Ferreira Aziz, W.	FNWI	Horizon Europe	Research and Innovation Actions	2022	1,000,751
Kamali, B.C.	FNWI	Horizon Europe	MSCA Postdoctoral Fellowships 2021	2022	187,624
Rooij, R.A.M. van	FNWI	Language in Interaction	Call postdoc positions	2022	162,774
Venema, Y.	FNWI	Horizon Europe	MSCA Postdoctoral Fellowships	2022	187,624
Haro Ollé, S. de	FNWI	NWO	NWA	2022	483,180
Buhrman, H.M.	FNWI	NWO	Take-off phase 1 - Feasibility studies WO	2022	39,948
Schouwstra, M.	FGW	Amsterdam Brain and Cognition	Talent grant	2022	125,000
Kalter, H.	FGW	NWO	PhDs in the Humanities	2022	195,858
Aloni, M.D.	FGW	NWO	Open Competition SSH	2022	777,207
Russo, F.	FGW	Horizon Europe	CL2-Democracy	2022	692,500
Schindler, T.	FGW	ERC	Starting Grant	2022	1,493,715
Behnke, G.	FNWI	NWO	Open Competition Domain Science - M	2023	329,737
Roelofsen, F.	FNWI	Universiteit van Amsterdam	IP Themes: midsize projects	2023	200,000
Betti, A.	FGW	NWO	SSH Open Competition M	2023	400,000
Ozols, M.	FNWI	NWO	Quantum Delta NL	2023	471,834

Table 20: Research projects awarded between 2018–2023 in competitions and which have funded research positions

11.5 Bibliometric Analysis and Output Indicators

11.5.1 Output count



11.5.2 Publications and Editorships

Institute for Logic, Language and Computation		2018	2019	2020	2021	2022	2023	Σ
Refereed journal articles	FGw	44	41	50	55	53	60	303
	FNWI	73	58	46	57	51	56	341
	ILLC	117	99	96	112	104	116	644
Books/monographs	FGw	1	3	2	3	4	4	17.5
	FNWI	1	1	0	3	2	3	6.5
	ILLC	2	4	2	3	6	7	24
Book chapters	FGw	11	15	5	5	4	13	52
	FNWI	11	14	11	9	8	10	64
	ILLC	22	29	16	14	12	23	116
Conference papers	FGw	21	20	22	23	25	20	131
	FNWI	59	80	78	76	59	90	442
	ILLC	80	100	100	99	84	110	573
PhD theses	FGw	5	1	4	5	4	1	20
	FNWI	8	5	13	8	2	10	46
	ILLC	13	6	17	13	6	11	66
Publications aimed at the general public	FGw	3	5	5	2	2	0	17
	FNWI	2	3	0	1	2	0	8
	ILLC	5	8	5	3	4	0	25

Table 21: Main categories of research output

11.5.3 Citations in Google scholar

Number of citations	Names staff members
> 10,000	Harry Buhrman, Ivan Titov, Yde Venema, Ronald de Wolf, (Johan van Benthem, Paul Vitanyi)
> 8,000	Henkjan Honing, Jaap Kamps, (Jos Baeten, Jeroen Groenendijk, Martin Stokhof, Anne Troelstra)
> 6,000	Alexandru Baltag, Rens Bod, Ulle Endriss, Robert van Rooij
> 4,000	Balder ten Cate, Floris Roelofsen, Ekatharina Shutova, Willem Zuidema, (Jan van Eijck, Federica Russo, Christian Schaffner)
> 2,000	Maria Aloni, Wilker Aziz, Tobias Blanke, Raquel Fernández, Sebastian de Haro, Reinhard Muskens, Khalil Sima'an, Sonja Smets, Petter Törnberg, (Pieter Adriaans, Franz Berto, Peter van Emde Boas, Theo Janssen, Michiel van Lambalgen, Jouko Väänänen, Frank Veltman, Henk Zeevat)

Table 22: Number of [Google scholar](#) citations of current ILLC staff members in December 2023

Author	Title	# citations	# citations 2018–2023
M. Li, P. Vitanyi	<i>An Introduction to Kolmogorov Complexity and Its Applications</i> , Springer-Verlag NY, 1993.	7837	1813
J Groenendijk, M Stokhof	<i>Dynamic predicate logic</i> , Linguistics and Philosophy, 14(1), 1991.	2384	488
A. Troelstra and D. van Dalen	<i>Constructivism in Mathematics</i> , Elsevier, 1988.	1490	540
K. Apt	<i>Principles of Constraint Programming</i> , Cambridge UP, 2003.	1480	411
J. van Benthem	<i>The Logic of Time</i> , Springer, 1983.	1352	305
F. Veltman	<i>Defaults in update semantics</i> , Journal of Philosophical Logic 25(3), 1996.	1250	377

Table 23: Google Scholar Citations: Selection of earlier pioneering work

11.5.4 Workshops and Conferences

	2018	2019	2020	2021	2022	2023
Conference	1	2	0	0	2	1
Workshop	11	11	4	4	5	5

Table 24: Workshop and conferences organised by ILLC in the evaluation period

11.5.5 Co-authorship (as reported in the Pure database)

	NLP&DH	TCS	MCL	FSPL	EPS	LMC
NLP&DH	66	0	0	21	3	9
TCS	0	30	7	1	1	0
MCL	0	7	24	8	16	0
FSPL	21	1	8	28	10	14
EPS	3	1	16	10	17	0
LMC	9	0	0	14	0	4

Table 25: Internal co-authorship for ILLC research units in the evaluation period

11.6 Awards and Prizes

2018

- Marco Del Tredici and Raquel Fernández received the COLING 2018 Area Chair Favorite paper award.
- Florian Speelman received the Andreas Bonn Medal 2018 from Dutch Society for the Advancement of Science, Medicine and Surgery (GNGH) for his PhD thesis on quantum cryptography (supervised by Harry Buhrman).

2019

- Andras Gilyen received the ERCIM Cor Baayen Young Researcher Award 2019 for his PhD thesis on efficient quantum algorithms (supervised by Ronald de Wolf).
- Taichi Uemura received the Best Student Paper Award for his paper on Homotopy Type Theory in HoTT, 2019.
- Raquel G. Alhama & Willem Zuidema received the Best Article Award of the 2019 Psychonomic Bulletin & Review journal for their paper “A review of computational models of basic rule learning: The neural-symbolic debate and beyond”. *Psychonomic Bulletin & Review*, 26(4), pp. 1174-1194.
- Phong Le and Ivan Titov’s paper was selected as the Best Paper Runner-up at ACL 2019
- Incurvati’s joint article with Florio ‘Metalogic and the Overgeneration Argument’, from the journal ‘Mind’ was selected among OUP’s Best of Philosophy 2019.

2020

- Jana Sotáková and her coauthors won a Best Paper Award at the 40th Annual International Cryptology Conference (CRYPTO-2020) for their paper on using genus theory in the context of the Diffie-Hellman problem.
- Rochelle Choenni’s MSc AI thesis, supervised by E. Shutova, received the Best MSc thesis award from Amsterdam Data Science.
- Mario Giulianelli’s MSc AI thesis, supervised by R. Fernández, received the Best MSc thesis award from Amsterdam Data Science.
- Bryan Eikema and Wilker Aziz received the COLING 2020 Best Paper Award for “Is MAP Decoding All You Need? The Inadequacy of the Mode in Neural Machine Translation”.
- Ivan Titov received an EMNLP 2020 Honorable Mention (5 best papers out of 3000 submissions)
- Ekaterina Shutova and her students won a prize at the NeurIPS 2020 Hateful Memes Challenge: their system was ranked fourth out of 3000 participants.
- Paul Vitányi and his coauthor Ming Li received a 2020 McGuffey Longevity Award for their textbook on Kolmogorov complexity and its applications.
- Harry Buhrman was installed as a new member of the Royal Netherlands Academy of Arts and Sciences (KNAW) in 2020, in recognition of his pioneering work in the field of quantum computing.
- Bas Cornelissen, Willem Zuidema, and John Ashley Burgoyne received the ISMIR 2020 Best Paper Award for “Mode Classification and Natural Units in Plainchant”. In: *Proceedings of the 21th International Conference on Music Information Retrieval*. Montreal, Canada, 2020, pp. 869–875.
- Ivan Titov became an ELLIS Fellow.

2021

- Ilaria Canavotto won in 2021 the Beth Dissertation prize for her PhD thesis ‘Where Responsibility Takes You’.
- Jos Baeten was appointed Officer in the Order of Oranje-Nassau in 2021, in recognition of his longstanding contributions to Mathematics and Computer Science.
- Rebecca Reiffenhäuser received a Best Paper Award at WINE 2021 for her co-authored paper on Allocating Indivisible Goods to Strategic Agents.
- H. Honing, J.A. Burgoyne, M. Sadakata, and F. Bouwer from the Music Cognition group received in 2021 a *Gewaardeerd!* research communication prize from the Royal Netherlands Academy of Arts and Sciences (KNAW).
- Peter van Emde Boas was elected Honorary Fellow of the Dutch National Association for Software Engineering (VERSEN) in 2021.
- Rochelle Choenni was awarded the prestigious Google PhD Fellowship to conduct research on multilingual NLP under the supervision of E. Shutova.
- Zoi Terzopoulou received the Mathematics Prize at the Women+ Symposium 2021, organised by the organisation Greek Women in STEM.
- Incurvati and Schlöder’s ‘Inferential Expressivism and the Negation Problem’, *Oxford Studies in Metaethics*, was awarded the Marc Sanders Prize in Metaethics.
- Ekaterina Shutova became an ELLIS Scholar.

2022

- Ece Takmaz received the Best Shared Task Paper Award at the Workshop on Cognitive Modelling and Computational Linguistics at ACL 2022.
- Davide Grossi won the Best Paper Award of the Blue Sky Ideas Track at the 21st International Conference on Autonomous Agents and Multiagent Systems (AAMAS-2022) for his paper on opportunities for computational social choice to improve blockchain technologies.
- Balder ten Cate and his co-authors received the ACM PODS Alberto O. Mendelzon Test-of-Time Award 2022 for their 2013 paper on ontology-based data access.
- Ronald de Wolf and his coauthors received the ACM STOC Test-of-Time Award 2022 for their 2012 paper ruling out the existence of efficient algorithms for the Travelling Salesman problem by means of linear programming.
- Oliviero Nardi won the university-wide UvA Thesis Award 2022 for his MSc AI thesis on the design of efficient algorithms to improve the transparency of group decision making (supervised by Arthur Boixel and Ulle Endriss).
- Alexandru Baltag and Nick Bezhanishvili won the best paper award at the 19th International Conference on Principles of Knowledge Representation and Reasoning, KR22, as co-authors of the paper ‘Topology of Surprise’.

2023

- Tobias Blanke is the Winner of the 2023 ISA-STAIR Annual Best Book Award.
- A paper on voting theory by Marie Schmidlein (MSc Logic graduate) and Ulle Endriss was the runner-up for the Best Paper Award at the 22nd International Conference on Autonomous Agents and Multiagent Systems (AAMAS-2023).
- Sander Becker received the Best Paper Award for his paper on Backtracking Counterfactuals at CLeaR 2023, the annual Conference on Causal Learning and Reasoning.
- Balder ten Cate and his coauthors won a Distinguished Paper Award at the 32nd International Joint Conference on Artificial Intelligence (IJCAI-2023) for their paper on learning concepts in the presence of ontologies.
- Balder ten Care and his coauthors won the Best Paper Award at the 42nd Symposium on Principles of Database Systems (PODS-2023) for their paper on the fitting problem for conjunctive queries.
- A paper by Balder ten Cate and his coauthors on fitting algorithms for conjunctive queries was recognised as an ACM SIGMOD Research Highlight in 2023.
- Ulle Endriss was installed as Fellow of the European Association for Artificial Intelligence (EurAI) in 2023, an honour bestowed in recognition of “significant, sustained contributions to the field of AI in Europe.”
- Jos Baeten was elected Honorary Fellow of the Dutch National Association for Software Engineering (VERSEN) in 2023.
- Ronald de Wolf was one of the recipients of the Gödel Prize 2023, awarded in recognition of work on linear programming and polyhedral methods for combinatorial optimisation.
- Ekaterina Shutova received an Outstanding Paper Award at ACL 2023, for her paper on “What’s the Meaning of Superhuman Performance in Today’s NLU?”
- Ivan Titov received an Outstanding Paper Award at ACL 2023, for his paper on “Compositional Generalization without Trees using Multiset Tagging and Latent Permutations”
- Raquel Fernández received an Outstanding Paper Award at EMNLP 2023 for her paper on “Cross-Lingual Consistency of Factual Knowledge in Multilingual Language Models”.
- Raquel Fernández became an ELLIS Fellow.
- Ulle Endriss received an Outstanding Senior Programme Committee Member Award at AAMAS-2023.

11.7 Limited set of Representative Publications

Books

- **Ivano Ciardelli, Jeroen Groenendijk, and Floris Roelofsen** (2018), *Inquisitive Semantics*, Oxford University Press.
- **Huib Dijkstra** (2021). *Borders as Infrastructure: The technopolitics of border control*. The MIT Press.
- Aradau, C., & **Tobias Blanke** (2022). *Algorithmic reason: The new government of self and other*. Oxford University Press.
- **Rens Bod** (2022). *World of Patterns: A Global History of Knowledge*. Johns Hopkins University Press. Open Access: Project MUSE - World of Patterns. Nominated for the Libris History Prize. Translated into Chinese, Polish and Turkish, other translations are underway.

- **Benno van den Berg** and Faber, E. (2022), *Effective Kan fibrations in simplicial sets*, Lecture Notes in Mathematics, 2021, Springer, Cham
- **Luca Incurvati and Julian Schlöder** (2023), *Reasoning with Attitude: Foundations and Applications of Inferential Expressivism*, Oxford University Press, New York.

Articles

- **Srinivasan Arunachalam and Ronald de Wolf**. Optimal Quantum Sample Complexity of Learning Algorithms. *Journal of Machine Learning Research*, 19: 71:1-71:36, 2018.
- **Marieke Schouwstra**, Henriëtte de Swart, and Bill Thompson. 2019. Interpreting silent gesture: Cognitive biases and rational inference in emerging language systems. *Cognitive Science*, 43(7).
- **Robert van Rooij and Katrin Schulz** (2020), 'Generics and typicality: a bounded rationality approach', *Linguistics and Philosophy*, 83-117.
- **Samira Abnar and Willem Zuidema** "Quantifying Attention Flow in Transformers". In: *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, Association for Computational Linguistics, July 2020, pp. 4190–4197.
- **Ulle Endriss, Ronald de Haan, Jérôme Lang, and Marija Slavkovic**. The Complexity Landscape of Outcome Determination in Judgment Aggregation. *Journal of Artificial Intelligence Research*, 69: 687-731, 2020.
- **Arianna Betti, Reynaert, M.; Ossenkoppele, T.; Yvette Oortwijn, Y.; Salway, A.; and Jelke Bloem**. Expert Concept-Modeling Ground Truth Construction for Word Embeddings Evaluation in Concept-Focused Domains. In *Proceedings of the 28th International Conference on Computational Linguistics (COLING 2020)*, pages 6690–6702, Barcelona, Spain (Online), December 2020.
- **Mario Giulianelli, Marco Del Tredici, Raquel Fernández**. Analysing Lexical Semantic Change with Contextualised Word Representations. *ACL*, 2020.
- Goltz, Franziska, and **Makiko Sadakata**. 2021. Do you listen to music while studying? A portrait of how people use music to optimize their cognitive performance. *Acta Psychologica*, 220: 103417.
- **Nicola De Cao, Wilker Aziz and Ivan Titov**. Editing Factual Knowledge in Language Models, *Empirical Methods in NLP*, 2021.
- Spijkervet, Janne, and **John Ashley Burgoyne**. 2021. Contrastive learning of musical representations. In *Proceedings of the 22nd International Society for Music Information Retrieval Conference*, pp. 673–81.
- **Maria Aloni** (2022), 'Logic and conversation: the case of free choice', *Semantics and Pragmatics*. 15.5, 1–60.
- **Alexandru Baltag, Nick Bezhanishvili, Aybuke Özgün, Sonja Smets** Justified belief, knowledge, and the topology of evidence. *Synthese*, 200, 512 (2022).
- **Balder ten Cate** and Victor Dalmau. Conjunctive Queries: Unique Characterizations and Exact Learnability. *ACM Transactions of Database Systems*, 47(4): 14:1-14:41, 2022.
- **Georgios Amanatidis, Georgios Birmpas, Federico Fusco, Philip Lazos, Stefano Leonardi, and Rebecca Reiffenhäuser**. Allocating Indivisible Goods to Strategic Agents: Pure Nash Equilibria and Fairness. *Mathematics of Operations Research*. Articles in Advance, 2023.
- **Schindler, T.** (2023), 'Unrestricted quantification and ranges of significance', *Philosophical Studies*, 180, pages 1579–1600.

11.8 PhD-programme

11.8.1 Success Rate of the PhD Programme

Start	F/M/O	Tot	Graduated after				Overdue	Dropout
			≤ 4 y	≤ 5 y	≤ 6 y	≤ 7 y		
2015	5/8/0	13	2 (15%)	7 (54%)	9 (69%)	9 (69%)	0 (0%)	4 (31%)
2016	7/9/0	16	2 (12%)	10 (62%)	12 (75%)	13 (81%)	0 (0%)	3 (19%)
2017	2/6/0	8	6 (75%)	7 (87%)	7 (87%)	8 (100%)	0 (0%)	0 (0%)
2018	4/6/1	11	4 (36%)	9 (82%)	9 (82%)	9 (82%)	0 (0%)	2 (18%)
2019	4/11/0	15	6 (40%)	12 (80%)	[12 (80%)]	[12 (80%)]	1 (7%)	2 (13%)
Total	22/40/1	63	20 (32%)	45 (71%)	49 (74%)	51 (80%)	1 (1%)	11 (17%)

Table 26: PhD Candidates 2015–2019

total	within 4y	within 4.5y	within 5y	within 6y	within 7y
66	25 (38%)	42 (64%)	49 (74%)	55 (83%)	61 (92%)

Table 27: PhD defenses 2018-2023

# PhD defenses	2018	2019	2020	2021	2022	2023	total
Logic and Language	4	2	6	4	2	4	22
Logic and Computation	5	3	5	6	3	5	27
Language and Computation	4	1	6	3	1	2	17
							66
Mathematical and Computational Logic						2	2
Theoretical Computer Science				1	2	3	6
Language and Music Cognition					1		1
Epistemology and Philosophy of Science					1	2	3
Formal Semantics and Philosophical Logic					1	2	3
NLP and Digital Humanities					1	2	3

Table 28: PhD Defenses per programme or unit

# PhD defenses/Faculty	2018	2019	2020	2021	2022	2023
Faculty of Humanities (FGw)	5	1	4	5	4	1
Faculty of Science (FNWI)	8	5	13	8	2	10
	13	6	17	13	6	11

Table 29: PhD Defenses per faculty

	Job after PhD		Current occupation	
Academia [prof/lecturer]	41 [6]	62% [9%]	34 [15]	51% [23%]
Non-academia [research]	25 [5]	38% [7%]	32 [8]	48% [12%]

Table 30: Placement of PhD alumni 2018–2023

Academic	UvA (ILLC, KdVl, IvI), TU Eindhoven, UConn, Tsinghua, LMU Munich, ETH Zürich, Queen Mary University, Pompeu Fabra, Copenhagen, UNSW Sydney, Vienna, Saint-Etienne and Maryland
Non academic	TNO, Microsoft, Facebook, Funda, Adyen, Google, eBay, Knights Analytics, Elsevier, ING-bank, Pacmed, Deltares, and Apple

Table 31: Examples of positions of PhD alumni 2018–2023 at time of writing

Name	Defense date	Supervisor	Supervisor ii	Supervisor iii
Shi, C.	2018-06-13	Smets, S.J.L.	Liu, F.	
Witteveen, J.E.	2020-01-29	Torenvliet, L.	Smets, S.J.L.	Wolf, R.M de
Vargas Sandoval, A.L.	2020-06-16	Baltag, A.B.	Jongh, D.H.J. de	Özgün, A.
Xie, K.	2020-11-26	Schulz, K.	Smets, S.J.L.	
Canavotto, I.	2020-12-15	Berto, F.	Smets, S.J.L.	Giordani, A.
Chartier, C.B.	2021-04-30	Veltman, F.J.M.M.	Smets, S.J.L.	
Solaki, A.	2021-06-18	Smets, S.J.L.	Berto, F.	
Bellomo, A.	2022-01-12	Betti, A.	Incurvati, L.	
Ramotowska, S.	2022-05-16	Szymanik, J.	Maanen, van, L.	Smets, S.J.L.
Bussière, L.N.	2022-11-25	Incurvati, L.	Betti, A.	
McHugh, D.M.	2023-05-23	Schulz, K.	Smets, S.J.L.	
Yan, J.	2023-09-11	Aloni, M.D.	Liu, F.	
Li, L.	2023-09-11	Smets, S.J.L.	Benthem, J.F.A.K. van	Ghosh, S.
Wontner, N.J.H.	2023-09-25	Löwe, B.	Incurvati, L.	Galeotti, L.
Wang, Y.	2023-09-12	Smets, S.J.L.	Liu, F.	Stokhof, M.J.B.
Pinto Prieto, D.	2024-11-25	Haan, R. de	Özgün, A.	
Choenni, R.M.V.K.	(2025-01-31)	Shutova, E.V.	Rooij, R.A.M. van	Garrette, D.H.
Wal, O.D. van der	(2025-04-31)	Schulz, K.	Zuidema, W.H.	
Xue, F.	(2025-08-31)	Baltag, A.B.	Smets, S.J.L.	Rafiee Rad, S.
Leidinger, A.J.	(2025-08-31)	Rooij, R.A.M. van	Shutova, E.V.	
Otten, D.D.	(2025-10-31)	Berg, B. van den	Geuvers, J.H.	Smets, S.J.L.

Table 32: PhD candidates with supervisors from different units

11.9 Diversity

11.9.1 Cultural Diversity

Year	Non-Dutch fraction of staff (based on FTE)	Number of nationalities
2018	69.6%	30
2019	70.0%	32
2020	70.5%	33
2021	69.9%	31
2022	70.8%	33
2023	72.7%	36
Avg	70.4%	

Table 33: Non-Dutch fraction of staff based on FTE, including PhD, postdoc, assistant, associate and full professors, where “Dutch” means born and raised in the Netherlands.

	All scientific staff	Professor	Assoc.prof (UHD)	Assis.prof (UD)	Postdoc	PhD
2018	69.6%	5.6%	6.7%	10.5%	19.9%	26.9%
2019	70.0%	5.5%	6.7%	12.2%	17.2%	28.5%
2020	70.5%	6.4%	6.5%	11.4%	17.8%	28.4%
2021	69.9%	5.5%	5.5%	11.9%	16.7%	27.8%
2022	70.8%	5.8%	7.3%	13.3%	16.4%	28.0%
2023	72.7%	5.3%	6.0%	15.2%	17.5%	27.7%

Table 34: Development of the percentage of non-Dutch scientists at ILLC, where “Dutch” means born and raised in the Netherlands.

	Professor		Assoc.prof (UHD)		Assis.prof (UD)		Postdoc		PhD	
	Dutch	Non-Dutch	Dutch	Non-Dutch	Dutch	Non-Dutch	Dutch	Non-Dutch	Dutch	Non-Dutch
2018	69%	31%	39%	41%	33%	67%	25%	75%	35%	65%
2019	60%	40%	40%	60%	42%	58%	13%	87%	35%	65%
2020	56%	44%	38%	62%	42%	58%	13%	87%	40%	60%
2021	53%	47%	38%	62%	33%	67%	24%	76%	35%	60%
2022	44%	56%	33%	67%	29%	71%	19%	81%	40%	60%
2023	47%	53%	31%	69%	25%	75%	22%	78%	38%	62%

Table 35: Staff Ratio Dutch / Non-Dutch (head count)

11.9.2 Gender Diversity

x\y	Professor		Assoc Prof		Assis Prof		Postdoc		PhD*		Neither
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
2018	11	3	11	2	15	6	25	7	26	16	1
2019	12	3	13	2	18	5	23	8	25	17	1
2020	13	3	14	2	16	7	20	11	27	19	1
2021	14	3	15	3	19	8	21	11	24	18	1
2022	12	4	14	4	20	8	26	11	31	14	1
2023	13	4	12	4	28	8	27	10	34	19	0

Table 36: Gender diversity ILLC Staff, where we restrict to PhDs employed by the UvA/ILLC)

Starting date	Name Researcher	Faculty	Position
15-02-2018	Dr. Ekatarina Shutova	FNWI	UD (now UHD)
15-01-2019	Dr. Bahareh Afshari	FNWI	UD (has left)
01-09-2020	Dr. Marieke Schouwstra	FGw	UD (now UHD)
01-10-2020	Dr. Aybüke Özgün	FGw	UD
01-09-2021	Dr. Gaëlle Fontaine	FNWI	Docent
01-11-2021	Dr. Karolina Krzyzanowska	FGw	UD
01-03-2022	Dr. Katrin Schulz	FNWI	UD (now UHD)
01-12-2022	Dr. Rebecca Reiffenhäuser	FNWI	UD
01-09-2023	Dr. Francisca Jahnke	FNWI	UHD (has left)
01-11-2023	Dr. Raquel Alhama	FGw	UD
01-08-2024	Dr. Martha Lewis	FNWI	UD
01-09-2024	Dr. Marianna Girlando	FNWI	UD
01-09-2024	Dr. Delfina Martinez Pandiani	FGw	UD
01-09-2024	Dr. Marleen Geboers	FGw	UD
01-11-2024	Dr. Ana Lucic	FNWI	UD

Table 37: New female senior ILLC members

11.9.3 Diversity and Inclusion at the University of Amsterdam

The University of Amsterdam wants to be a university where everyone feels at home and feels respected. Diversity and inclusion are important core values for the university. The UvA pursues an active [diversity policy](#) to help reduce inequality, remove barriers and create equal opportunities for everyone. This includes a diversity policy with four important goals: (i) Increasing accessibility and study success for students for whom studying at a university is a less obvious choice; (ii) Collaborating successfully in diverse teams; (iii) Hiring, promoting and retaining staff from all backgrounds; (iv) Recognising and sharing initiatives that work. The UvA also has a [Gender Equality Plan](#) to promote gender equality in research and innovation. The University of Amsterdam has a designated, fully staffed Chief Diversity Office Team D&I Office chaired by ILLC member [Machiel Kestra](#) and a network of Faculty Diversity Officers. The UvA also has dedicated HR capacity on both a central and decentral level to support and contribute toward further Gender Equality. See the [blog](#) on how the ILLC is addressing diversity. The University of Amsterdam offers its staff a broad range of [active-involvement workshops](#) that have proven effective regarding diversity and inclusion (e.g. workshops aimed at viewing situations from different perspectives, listening and participatory leadership).

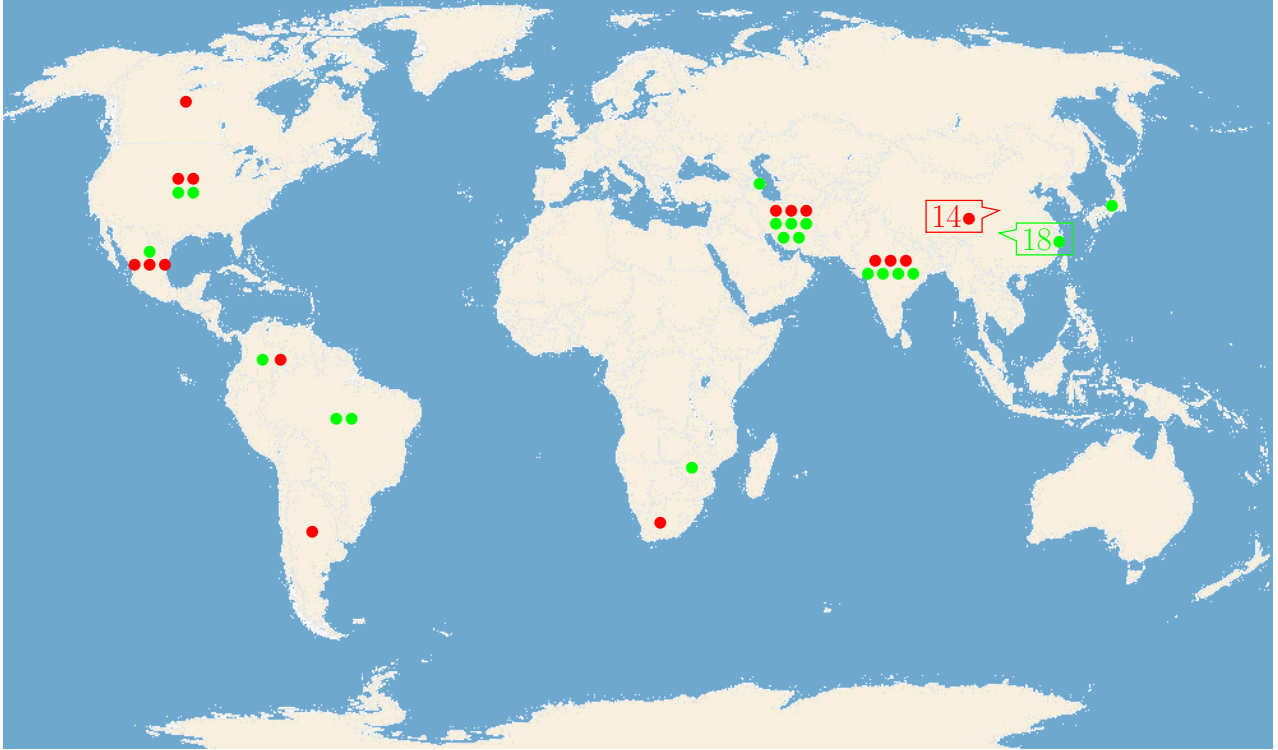


Figure 5: **Guests** and **PhD candidates** from outside Europe

11.11 Benchmark

ILLC's research profile can be compared to the Center for the Study of Language and Information at Stanford University ([CSLI](#)), the Munich Center for Mathematical Philosophy at the Ludwig Maximilians-Universität München ([MCMP](#)) and the Institute for Language, Cognition and Computation at the University of Edinburgh ([ILCC](#)). We highlight connecting research lines below:

- CSLI's interdisciplinary profile, covering the research of psychologists, linguists, philosophers and computer scientists who are involved in computational, logical and the stochastic modelling of functional processes, partly mirrors ILLC's profile in LoLa (FSPL, ESP) and LoCo (NLP&DH, LMC). CSLI has also been a long-standing research partner with the ILLC, partly due to the fact that Johan van Benthem has held research positions there since 1992.
- Researchers at MCMP use mathematical methods in various areas of philosophy, and the various formal methods they use include logic and probability theory, which are essential research tools at the ILLC. Key areas that overlap in interest with the ILLC include epistemology, logic and philosophy of language, philosophy of science and philosophy of mathematics, as well as metaphysics. Some students that were trained by them got research positions at the ILLC, and ILLC students and postdocs have received positions there. We are intensifying our collaboration with the MCMP, both in research and in education.
- The ILCC is a leading research institute dedicated to the pursuit of basic and applied research on computational approaches to language, communication and cognition. ILCC's research is interdisciplinary in nature, and there are strong connections to other departments in Edinburgh. Within the area of natural language processing, computational linguistics, semantics and pragmatics as well as in computational music we see overlapping interests with LaCo (NLP&DH, LMC) at the ILLC. The School of Informatics at the University of Edinburgh hosts leading researchers in the area of logic and computation, in both pure and applied logic (including in quantum information theory and quantum logic) which connects well

to the research that is being pursued in LoCo (MCL, TCS). ILCC hosts researchers trained at the ILLC while former ILCC members have obtained research positions at ILLC.

12 Acronyms

AAA	Amsterdam Academic Alliance
ABC	Amsterdam Brain and Cognition (Research Priority Area)
ACLC	Amsterdam Center for Language and Communication
AIHR	Amsterdam Institute for Humanities Research
ASP	Amsterdam Science Park
AUC	Amsterdam University College
CSLI	Center for the Study of Language and Information at Standord University
CWI	Centrum voor Wiskunde en Informatica (Centre for Mathematics and Computer Science)
ERC	European Research Council
ESSLLI	European Summer Schools in Logic, Language and Information
FGw	Faculteit der Geesteswetenschappen (Faculty of Humanities)
FNWI	Faculteit der Natuurwetenschappen, Wiskunde en Informatica (Faculty of Science)
FoLLI	The Association for Logic, Language and Information
FTE	full time equivalent (1.0 fte = 38 work hours/week)
Gravitation project	A prestigious NWO funding programme for large consortia (Zwaartekracht project)
H2020	Horizon 2020 funding programme created by the EU/EC
HORIZON EUROPE	Research and innovation funding programme until 2027 created by the EU/EC
ILCC	Institute for Language, Cognition and Computation University of Edinburgh
ILLC	Institute for Logic, Language and Computation
IoP	Institute of Physics of the UvA
ITN	Marie Skłodowska-Curie Innovative Training Networks
IvI	Institute of Informatics of the UvA
IXA	Innovation Exchange Amsterdam
JRC	Joint Research Center in Logic
KdVI	Korteweg-de Vries Institute for Mathematics of the UvA
KHMW	Koninklijke Hollandse Maatschappij der Wetenschappen (Royal Holland Society of Sciences and Humanities)
KNAW	Koninklijke Nederlandse Academie van Wetenschappen (Royal Netherlands Academy of Arts and Sciences)
LaCo	Language and Computation Research Programme
LoCo	Logic and Computation Research Programme
LoLa	Logic and Language Research Programme
MCMP	Munich Center for Mathematical Philosophy (More Women Researchers as University Lecturers)
NLP	Natural Language Processing
NVAO	Nederlands-Vlaamse Accreditatie Organisatie (Dutch-Flemish Accreditation Organization)
NWO	Nederlandse Organisatie voor Wetenschappelijk Onderzoek (Netherlands Organisation for Scientific Research)
Pure	Database management system in which researchers register their research output
PVC	PhD Programme eValuation Committee

QMQUI	Quantum Matter and Quantum Information (Research Priority Area)
Research FTE	part of FTE officially dedicated to research
RPA	Research Priority Area
SEP	Standard Evaluation Protocol
STW	Stichting voor de Technische Wetenschappen Technology Foundation
UD	Universitair Docent (Assistent Professor)
UHD	Universitair Hoofddocent (Associate Professor)
UvA	Universiteit van Amsterdam (University of Amsterdam)
VC	Vrije Competitie (NWO's Free Competition grant scheme)
VI	Vernieuwingsimpuls (NWO's Innovative Research Incentives Scheme)
VU	Vrije Universiteit
WoS	Web of Science