RESEARCH REVIEW

Creative Computing (CC) research programme

Language, Communication and Cognition (LCC) research programme

2012-2017

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Contents

Preface

The evaluation committee that authored this report was assembled by the University of Tilburg, and it included expertise from a broad spectrum of disciplines, consisting, as it did of Prof. Dr. Arthur Graesser, University of Memphis, Prof. Dr. Catherine Pelachaud, *Centre national de la recherche scientifique*, and *Sorbonne Université*, Paris, Prof.-em. Dr. Ir. John Nerbonne, University of Groningen (chair), and Prof. Dr. Joseph Walther, University of California at Santa Barbara (vice-chair). Beyond their specialist expertise, the members were remarkable and valuable for their broad view of the study of language, communication, cognition, and computing, and for their willingness to examine scientific areas well outside their research foci proper. They considered practical issues of organisation, financing and management that sometimes seemed foreign at points. These topics were also included in the evaluation. The committee enjoyed its collaboration and I am grateful to all of them for their professional attitudes and pleasant interaction.

Esther Poort and Annemarie Venemans served as secretaries to the committee. They were essential to the process at all stages, suggesting a division of labour, providing more concrete instructions to committee members on how to follow the Standard Evaluation Protocol (SEP), as well as on how to keep the "Terms of Reference" (ToR) of our particular evaluation in mind. They sat at my right hand (or at Joseph Walther's) during meetings and kept notes to ensure that the committee was addressing *all* the crucial points of the SEP and the ToR. They also received the rough drafts of all the various parts of the report, which they edited with me. I was very grateful not only for their close attention to the report's expected topics, but also for their efficient and clear style of writing. I am grateful for all the very competent work that they invested in this report.

The researchers of the Creative Computing research programme (CC) and the Language, Communication and Cognition research programme (LCC) at Tilburg University (TiU) were assiduous in providing us with a great deal of information on their work in the six year review period, 2012-2017, not only with respect to matters that are normally catalogued carefully, such as publications and grants, but also with respect to their record in matters that in the past have fallen outside academic reporting, such as work on scientific popularisation or marks of recognition from outside academia. We received a thirty-six-page report plus several substantial appendices on the research programmes, most them informationally dense. All of this material facilitated the committee in obtaining as complete a picture of the work at TiU as possible. On the occasion of our visit on Dec. 14, 2018 we spoke with over 40 CC or LCC members about their scientific work; their aspirations, and how well they found themselves able to work and advance professionally at TiU; how well their various research lines dovetailed with the institute's strategic emphases – both scientifically and with respect to extra-scientific interests and applications; and, perhaps most extensively, about their frustrations in seeking to realise serious scientific and applied-science ambitions at TiU. I am certain that I speak for all committee members when I acknowledge how much we profited from the very cooperative atmosphere we encountered during our visit.

A chair who is currently an emeritus professor may be forgiven a personal note, even in the foreword to a very official document. Science, I believe, profits a great deal from its younger practitioners. Our future is in their hands, so it behoves us as a profession to see that they get a fair chance to prove themselves. We therefore paid special attention to the needs of younger scholars in our evaluation, and we were gratified to see that the Tilburg programmes were a step ahead of us in this regard.

Our visit was well organised and our reception at TiU was cordial. We thank Prof. Dr. Marc Swerts, Mr. Cécile de Vos, and Ms. María José Rodil Llera, MA, for their hospitality.

John Nerbonne, chair of the committee

1. Introduction

1.1 Terms of reference for the assessment

The quality assessment of research of the programmes Creative Computing (CC) and Language, Cognition and Communication (LCC) of Tilburg University (TiU) is carried out in the context of the assessment system as specified in the Standard Evaluation Protocol for Public Research Organisations by the Association of Universities in The Netherlands (VSNU), the Netherlands Organisation for Scientific Research (NWO), and the Royal Netherlands Academy of Arts and Sciences (KNAW).

The review committee was asked to assess the scientific quality and the relevance and utility to society of the research conducted by the programmes CC and LCC of Tilburg University in the reference period 2012-2017, as well as its strategic targets and the extent to which it is equipped to achieve them.

Accordingly, three main criteria are considered in the assessment: research quality, relevance to society, and viability. In addition, the assessment considers three further aspects: the PhD training programme, research integrity and diversity.

This report describes findings, conclusions and recommendations of this external assessment of CC and LCC.

1.2 The Review Committee

The Board of Tilburg University appointed the following members of the committee for the research review:

- Professor John Nerbonne (chair)
- Professor Arthur Graesser
- Professor Joseph Walther (vice-chair)
- Professor Catherine Pelachaud

More detailed information about the members of the committee can be found in Appendix A. The Board of Tilburg University appointed dr. Annemarie Venemans and drs. Esther Poort of De Onderzoekerij as the committee secretaries. All members of the committee signed a declaration and disclosure form to ensure that the committee members made their judgements without bias, personal preference or personal interest, and that the judgment was made without undue influence from Tilburg University or stakeholders.

1.3 Procedures followed by the committee

Prior to the site visit, the committee received detailed documentation comprising the self-evaluation report of CC and LCC, including appendices and the Standard Evaluation Protocol (SEP) 2015-2021. In addition, the committee studied the midterm review report and previous assessment report of the Tilburg center for Cognition and Communication.

The committee proceeded according to the SEP. The assessment was based on the documentation provided by the institute and the interviews with the management, a selection of researchers of the institute, and PhD students. The interviews took place on 14 December 2018 (see Appendix B).

As defined in the Terms of Reference the committee was requested to separately score the quality of the programmes on a 1-4 scale, according to the Standard Evaluation Protocol (SEP). To do so the site visit consisted of a mix of joint and parallel sessions. During the parallel sessions the committee was split in two sub-committees, as follows:

Sub-committee CC:

- Professor John Nerbonne
- Professor Arthur Graesser
- Annemarie Venemans (secretary)

Sub-committee LCC:

- Professor Joseph Walther
- Professor Catherine Pelachaud
- Esther Poort (secretary)

To guarantee an optimal assessment of both programmes Tilburg University installed a chair and a vice chair within the committee. Professor John Nerbonne acted as the committee chair. Professor Joseph Walther acted as vice chair of the committee.

The committee discussed the assessments at its final session during the site visit. The members of the committee commented by email on the draft report. The draft version was then presented to the programmes for factual corrections and comments. Subsequently, the text was finalised and presented to the Board of Tilburg University.

2. Institutional embedding and research area

The research programmes CC and LCC are based in the Tilburg School of Humanities and Digital Science (TSHD) of Tilburg University (TiU). As of 2018, the Tilburg School of Humanities changed its name into the Tilburg School of Humanities and Digital Sciences to better reflect its new profile for the future.

TSHD comprises of four departments:

- Department of Cognitive Science and Artificial Intelligence (DCA);
- Department of Communication and Cognition (DCC);
- Department of Culture Studies (DCU);
- Department of Philosophy (DFI).

The departments DCA and DCC were formed out of the Department of Communication and Information Sciences (DCI, which existed until 2018). Until 2018, the research for both the CC and LCC programme was based in DCI, within the framework of the Tilburg Center for Cognition and Communication (TiCC). TiCC was established in 2008 and in 2015 became one of the five Centers of Excellence at TiU.

Within TiCC, CC concerns itself with the computational modelling of cognitive processes in the visual, linguistic, and ludological domains. LCC explores cognitive, functional and social aspects of human communication through a multidisciplinary approach for a broad variety of domains.

3. Assessment of the research programme Creative Computing

3.1 Quantitative assessment

The committee assessed the programme CC both quantitatively and qualitatively. For the quantitative assessment a four-point scale is used, according to the standard evaluation protocol 2015-2021. The explanation of the criteria underlying the scores can be found in appendix D.

According to the SEP scoring system, the committee has awarded the following scores to the programme CC.

Research quality:	2
Relevance to society:	1
Viability:	2

The qualitative assessment of the programme can be found in the next sections.

3.2 Research quality

The CC programme at TiU investigates human and artificial intelligence (AI) with a focus on their interaction, i.e., the interfaces between technologies and users. It aims to employ artificial intelligence, data science and computer science "in the light of cognitive science". The self-evaluation report identifies emphases in "language and data technologies, robotics and avatars, serious gaming, virtual and mixed reality", where the interactions between software and the "gamers" lie in CC's special focus. This is a broad remit, perhaps even more so due to the fact that many of the emphasised areas are attracting enormous attention in centres for both pure and applied research world-wide. The attention being paid to these topics also indicates that CC is attuned to current technology developments in today's societies. Its relatively small size (4.1FTE/yr. in 2012-2017) will make it impossible for CC to compete broadly in all of these areas, so it was good to hear that more positions were allocated in 2018 and more are anticipated in the future. This growth in many areas is very healthy, but there will be a point in CC's evolution when it will be difficult to compete without a sharpening of its focus.

The introductory section of the self-evaluation report notes four foundations, one claiming that CC distinguishes itself from all other departments at TiU by developing computational models and focusing on data science and artificial intelligence, with a second proclaiming a preference for the methodologies of computer science (CS) and AI rather than communications and culture studies. The latter suggests that CC methodologies are somewhat different than those in communication and culture studies, even though the rise of digital humanities in the last ten years has blurred the boundaries of methodologies of inquiry. The committee mentions this only to suggest that a more reflective expression of the CC vision, scope, and methodologies would be useful. The committee suggests that the foundations of CC need to be articulated in a manner that goes beyond the local situation of TiU and onward to an internationally distinctive direction.

The committee recognises CC's faith in the seamless connection between artificial and natural intelligence and agrees that this provides a firm, but not necessarily infallible, foundation for work in the research programme. In the self-evaluation report, CC points to several computationally oriented cognitive science programmes as benchmarks they compare themselves with and attempt to emulate. The efforts are worthwhile. It is also important to be mindful of the large budgets and number of colleagues of the competitors so that the programme can have realistic ambitions.

The CC programme is strong in publications. During the review period, the programme published 70 journal articles and 185 conference papers (see also table 1.3 appendix C), or about 12 articles and 31 conferences contributions annually. The five key publications illustrate nicely the wide range of topics researched by the programme and have been cited on average 25 times, which is a respectable level for publications 1-6 year old. Articles in conference proceedings are necessary to be visible in the international technology arenas and to attract funding, particularly in artificial intelligence and computational linguistics, where timely dissemination is essential. A quick sample from the publication list confirms that the CC researchers are publishing in selective and influential venues. The self-evaluation report shows that eight CC members have h-indices of 19 and more.

CC produces useful products for peers. The CC programme has provided source code for linguistic tasks and machine learning algorithms through GitHub and other channels, and they have provided datasets for distribution. One Matlab dimension reduction toolbox has been cited 1620 times. This all looks very positive. The committee suggests that the programme begin monitoring the use of all its products for peers systematically. An excellent session involving software and embodied demonstrations was offered to the committee, who found it useful and enlightening. These were promising innovative advances in agent technologies, virtual worlds, multichannel communication, collaborative problem solving, and affect sensing. CC is considering the question of whether these innovative advances could be shared with other colleagues and computational platforms. Sharing digital and data assets with other institutions and with the business sector could be essential for scaling up CC contributions. Moreover, the researchers demonstrating systems need to succinctly and clearly articulate the research questions their work was designed to answer. These are important, but difficult goals to accomplish. Researchers need to be able to identify the needs of colleagues and customers, but also be vigilant of software standards. UT administrators need to recognise that this is a new process in academia so they need to support the researchers' efforts to move forward in the 21st century.

CC was strong in attracting funding during this period. The most salient efforts were large scale projects that share resources with partners with industry, the community, and other academic institutions. The CC at TiU has received major visibility in being at the helm of these large-scale projects. As demonstrated in the self-evaluation report, second and third stream funding totalled roughly 5 FTE/yr on average. If the expense for 5 FTE/yr is about €500K/yr, then the total amount in CC was about €3Mil. This level of external funding (5 FTE/yr) is slightly higher than the 4.1 FTE of permanent staffing, which is in a positive direction. However, it is important to have a balanced portfolio of funding. It would also be impressive to see some success in the very selective research programmes of NWO (including STW) and ERC. The committee was pleased to hear that less senior staff have been actively encouraged to apply for NWO and ERC grants, noting that the COSLI project was funded by NWO.

The professors who head the CC programme are excellent scientists capable of not only managing but also leading their institute. They have excellent international reputations. It is also encouraging to see that several younger researchers are establishing themselves in the scientific world. Members of the CC frequently serve on programme committees for important conferences and workshops, and they are members of editorial boards for leading journals; they were awarded the best paper award at CoNLL and best abstract award at ECCN for example. A CS&AI team won the best lab presentation award at the DRONGO Language Festival. One researcher was twice awarded the TechHack award of Goldsmith University's Tech society. Finally, one researcher is *Professeur invité* at the *Université Sorbonne Paris Cité*.

3.3 Societal relevance

The committee analyses societal relevance with respect to outreach activities, including activities such as films, websites, publications and productions for a popular audience, as well as activities that flow into useful products and processes. The latter may be software components but also consulting and advisory reports. They are often commercial, but they might also arise in collaboration with organisations that are not geared toward profit, i.e. governmental or charitable organisations.

CC has been very active in outreach activities, by holding popular lectures (including four TEDx talks), producing educational materials, holding educational events (dojos for coders), and providing software that is often suitable for education (this overlaps with the "products for peers" category above). The

committee was impressed by the quantity and quality of the list of software packages made available by CC researchers. CC members have conducted demonstrations at the science museum NEMO and at the pop festival lowlands. They have often appeared in the national and occasionally in the international media. One of the directors was nominated for a *Klokhuis* award, which is given annually to the researcher who best makes science accessible to children. This is a very good record in outreach, which clearly contributes to societal relevance.

When we turn to more applied science, i.e. channelling scientific expertise into products and services useful to society at large, the committee has seldom seen a programme as active as the CC in pursuing this. They have been instrumental in founding three different institutes for fostering connections with industry: the DAF technology lab, the Jheronimus Academy of Data Science (JADS) and the Mind Labs. Tilburg University can be proud of the size of the external funding (ICAMPIONE, VIBE). The DAF technology lab focuses on providing virtual and mixed reality presentations in a setting in which sensors of various sorts are available to monitor the effects on participants, e.g. EEG scanners, fNIRs, and eye trackers. The DAF lab has already resulted in 12 Mil EUR. in projects including 2 PhD fellowships. JADS is a cooperation with Eindhoven aimed at providing expertise on big data and encouraging entrepreneurship involving this expertise. Mind Labs is described with enthusiasm ("one exciting and ongoing dynamic of amazing discoveries"), including cooperation with two professional education institutions, the city of Tilburg and the largest news agency in the Netherlands. The focus is on the interaction of users and machines, especially involving robotics and avatars, virtual and mixed reality, serious games and language technologies. The demonstrations convinced the committee of the scientific and applied potential of the cooperation.

It is impressive that two patents were awarded during the reporting period. The committee was also impressed with the fact that a large number of societal groups are already providing financial resources to the activities of the new programme.

The remarkable activities of the CC have not escaped the attention of their societal partners. One CC member is also a member of the Steering Group Smart Industry. Another researcher was accepted by the VR company Oculus to promote diversity and excellence in VR development. Two members participate by invitation in the Digital Society initiative of the joint Dutch universities (VSNU), one was invited to address the British treasury on psychological factors that might influential macroeconomics, and another member has joined by invitation the Royal Holland Society of Sciences and Humanities.

The committee is also impressed by the ambitious targets of the coming years. These could be made more concrete and specific, however. For example, the first goal to support the rise of the digital society by developing and evaluating methods for human machine interaction would be easier to grasp if it were a bit more concrete. Will these be smart phone apps that monitor user behaviour, new experimental techniques, or new interface technologies, perhaps for VR glasses?

CC is one of the most enterprising institutes the committee has ever seen anywhere. Its societal relevance is already very strong. The committee would recommend efforts to gauge this relevance more systematically, such as the way the DAF labs report that two PhD fellowships are being paid by private companies as result of the industrial collaboration, in start-up companies and their success, in industrial collaborations, and/or in the number of students placed within relevant companies.

3.4 Viability

CC has performed very well during the reporting period. Its publication record was solid and its production of software ("products for peers") has been very good. It has been successful in generating external funds for its research, a sure sign of viability. CC has moreover been outstanding in its efforts to engage societal partners in its research.

The committee was initially sceptical of the self-evaluation's report of awards totalling roughly €30Mil, which would translate into €5Mil/year, a startling amount. In an interview with the programme leaders, the committee learned that most of this money flowed further to various partners and some was invested in equipment. That is quite expected in technology centres that are distributed with other institutions. Again, CC and TiU is at the helm of these large scale efforts, which is substantial visibility, but it is important to also be mindful of what resources TiU receives financially to cover its own obligations.

CC has enthusiastic support at the level of the faculty and the university. The directors of the CC programme are confident that they dispose of sufficient funds to facilitate research, e.g. to provide funds for the release time of staff members in case they need to finish important projects or to complete important research proposals. They enjoy a substantial degree of autonomy in the hiring of faculty, as long the searches are coordinated with the departmental instructional units. As a consequence of the recent split of the CC and LCC programmes, each programme overlaps in personnel with its corresponding instructional programmes, which facilitates a coordinated approach to the recruitment of new faculty staff.

The committee appreciated the supportive attitude of the less senior staff, who emphasised the enthusiasm of the programmes, the relatively non-hierarchical nature of professional relations, and the freedom they are given to develop their own programmes of research. The committee heard only one complaint that the personal computing facilities were not up to par, which of course no institute with ambitions of excellence can afford to ignore.

There are outstanding opportunities for CC in the near future, both arising from the new three institutes it has founded (see section on societal relevance), but also from the impact themes of the university, namely Empowering the Resilient Society, Enhancing Health and Wellbeing, and Creating Value from Data. CC researchers seem destined to be central in the efforts to realise the last theme, but there are CC researchers playing a central role in all three themes.

The leadership has clearly been strong, which includes replacing very important members who left during the reporting period. This might have been crippling, but the programme seems to have arisen from its adversities strengthened rather than weakened. The SWOT analysis is candid and reflective. The committee commends the programme for its flat structure that encourages interaction.

The TiCC end-term evaluation (2015) recommended that the center look more actively for societal partners, especially in local industry, which CC has clearly taken to heart. The evaluation also recommended that more funding proposals be submitted to the EU, and proposals have been submitted there as well.

In spite of many reasons for optimism, the committee sees a problem in viability due to the very small size of this research unit. The SEP recommends that programmes have minimally 10 FTE in permanent staff for an evaluation, 2.5 times larger than CC during the evaluation period. When one considers how vulnerable a small programme is to the potential departure of members, it is also clear why a minimum size is sensible. CC has only three full professors, and the loss of even one could be devastating. This problem is also reflected in the SWOT, where “Growth and PhD supervision” is listed as a threat. The committee understands this to indicate that supervisors are pressed to find enough time for their PhD students. The dean assured us that CC has already increased in size, and that new opportunities would be forthcoming.

The committee appreciated the enthusiastic, almost exhilarated attitude of CC members when discussing their institute, but nonetheless could not stifle a retake when the programme leaders repeatedly stated that they saw no risks in the paths they were pursuing. The committee identifies several risks, including a possible shift from the general popular interest in AI and data mining to other areas or to a sharpened focus in one or both of these. This would naturally be coupled with a drop in the popularity of the technical areas. The potential competition of the established technical universities is another risk. It is clear that CC is filling a local need in an excellent way, but less clear that the work will provide opportunities for excellence on a global scale.

The committee found the aims and strategy of CC extremely broad and heard rather often that the research programme is trying many things and were “spreading their bets”. The committee believes that there will come a time in the future when a more focused and better articulated version of programme’s vision, scope, and strategy would be useful to members of the CC programme and to TiU’s academic administration.

3.5 PhD Programme

The 25 PhD holders from CC who received their degrees between 2012 and 2017 are nearly all active in areas of research or in the commercially useful applications of the research. They represent 4 PhD

defences/year, or roughly 1 per FTE research employed at the university. This is a good rate of PhD production.

The CC PhDs are finding jobs in business and academia, which speaks to the quality of the training. However, the Tilburg PhD students take an inordinate amount of time to complete their degrees. For example, only 14% finish in the allotted time (of four years). After 7 years or earlier that is 43%. This percentage includes candidates (34%) who have obtained a doctorate within 6 years or earlier. It is widely acknowledged that students in interdisciplinary fields require more years of training, particularly when they acquire or change methodologies. That being said, it is important to revisit the time course of the PhD training.

The PhD students are explicitly satisfied with their access to supervisors and others with the expertise needed. There is a mentor available for confidential counselling in the case of conflicts. The candidates are satisfied with the level of funding available for attending conferences, and they are optimistic about completing their degrees on time. But PhD students are not all aware of courses available to them, such as courses at the Tilburg faculty graduate school (e.g., the ethics course) or courses at the national disciplinary organisations such as SIKS or LOT, nor were they uniformly aware of their own personal training and supervision programmes. There should be a more consistent communication in the direction of the graduate students on the availability of training, and a more consistent monitoring of their training plans.

Some Ph.D. candidates expressed a need to receive more assistance in finding living quarters. Lodging can be expensive and sometimes difficult to secure, especially from those outside of the Netherlands.

3.6 Research integrity

The CC has an unusually detailed report on its efforts to ensure good data management and to cultivate a spirit of integrity among its members. The committee was favourably impressed by the CC's attention to confidentiality requirements and by its prudent maxim "extraordinary results require extraordinary evidence." On the other hand, some PhD students were not aware of the course on scientific ethics that is offered locally; students that had participated in the course were sceptical about it being required.

3.7 Diversity

From the section on diversity in the self-evaluation report, the committee has the impression that CC shares the goals of the Dutch universities in general, namely to have a staff that reflects the student body (and indeed the supporting citizenry) in diversity with respect to ethnicity and/or nationality, but especially with respect to gender. As the self-evaluation states, this can create "a powerful incentive for [...] the development of talent".

From this perspective, it is disappointing to read that "department staff get selected on the basis of quality, not on the basis of diversity requirements" – as an opening statement in the section on diversity! Naturally, every department and programme should strive for the best possible quality in staff. However, potential staff come from different cultures and countries, with different native languages and opportunities in their past, which complicates assessments of quality. Given the commitment to have a staff that reflects the diversity of its students, one might conclude that one needs to be proactive, i.e. to seek and encourage appropriate candidates in the earliest possible phases of a search, and not to rely on optimal candidates applying without special action on the part of research directors and recruitment committees. In this context, it is all the more reassuring to read that a vacancy has been created for a female full professor in simulation. This is an excellent step.

3.8 Recommendations

The committee invites the programme to consider the following suggestions:

- The programme should eventually focus its strategy more narrowly for the coming years, and articulate it in a brief position paper (2-3 pp.). It might be a good exercise to consider what areas of AI, for example, will versus will not play a role in CS&AI in the near future.
- The programme should guarantee that all members have access to all the computing power they need.
- The assistant and associate professors should continue to seek the more conventional NWO and ERC grants in order to achieve a balanced portfolio of external funding.
- PhD candidates should be systematically informed about opportunities for further training, both in generic skills and in very specialised courses. The research programme needs to coordinate with the graduate school to ensure that information is systematically provided.
- PhD candidates should know about their training and supervision plans and regular meetings should review these.
- The completion timetable rates for PhD candidates must be improved, without compromising the quality of PhD projects and the final dissertations.
- Proactive measures to improve gender diversity should be adopted.

4. Assessment of the research programme Language, Communication & Cognition

4.1 Quantitative assessment

The committee assessed the programme LCC both quantitatively and qualitatively. For the quantitative assessment a four-point scale is used, according to the standard evaluation protocol 2015-2021. The explanation of the criteria underlying the scores can be found in appendix D.

According to the SEP scoring system, the committee has awarded the following scores to the programme LCC:

Research quality:	1
Relevance to society:	2
Viability:	2

The qualitative assessment of the programme can be found in the next sections.

4.2 Research quality

The research topics covered by LCC include human communication in face-to-face and digital media with an increasing focus on the application of theoretical insights to applied and socially relevant settings (such as eHealth). The research programme deals with understanding cognitive processes, nonverbal communication, communication in different settings (e.g., business, culture, etc.). LCC looks at human-human communication but also human-system communication. It applies a variety of methodologies: corpus analysis, computational modelling, experimental studies, ethnographic studies, etc. This strategy appears to be rewarding in terms of securing research funding and increasing publication rates.

The research conducted at LCC is of very high quality; LCC has an impressive publication record in highly ranked international journals and conference venues. Some of the work is outstanding, including publications in highly ranked journals from the different domains covered by LCC (e.g., IEEE Transactions on Affective Computing, Computational Linguistics, Frontiers of Psychology, PLoS One, Human Communication Research, Communication Research, Computers in Human Behaviour, etc.). During the review period, a significant increase in the volume of publications is apparent, particularly in the last two years; the number of refereed articles rose from 28 (in 2012) to 46 (in 2016) and 47 (in 2017).

LCC has attracted additional research funding in very recent years and attracted new staff members with specialised knowledge, while experiencing a modest increase in the number scientific staff and overall FTE over the review period. The programme also showed an increase in external grants and research contracts bringing the success rate to an enviable level. Grants include awards from ERC, and prestigious national competitive funding programmes. Among these proposals, LCC looks at human-robot communication (L2TOR project), and cross-cultural communication (ERC consolidator grant). The programme appears to be strategizing its research efforts well.

The LCC programme has developed and maintained a very strong international reputation through the leadership activities of a number of its staff and their participation in professional associations and editorial work, as well as through a high level of productivity in the top journals in its fields of study. It is among the ranks of several Dutch universities with exceptionally strong reputations in the field of Communication (e.g., UvA and VU Amsterdam). Its PhD theses produce articles in strong journals, which adds to the unit's reputation for vitality.

In terms of comparison to other Dutch communication units, the LCC programme adopts an interdisciplinary approach: drawing on traditions in social science, computational research, and humanities, according to the benchmarking information, the programme positions itself (in respect to Communication units in other Dutch universities) as capitalising on more diverse approaches to its

research than similar units that are embedded in social science or humanities schools more exclusively. The LCC programme has shown some strength in an emphasis on communication via technology and social media, and it seems that this focus that supports its characterisation as having a strong computational component. The potential to include a stronger concentration in computational social science approaches to communication study may enhance the unit's position in the future, and with respect to other Dutch programmes in Communication, by capitalising on data science approaches to hypothesis-testing.

Despite the separation of LCC and CC into distinct programmes in the recent past, it appears that LCC continues to bridge traditional and computational methods effectively, in a variety of ways, as the committee learned during the site visit. First, a number of LCC/CC research collaborations continue. Second, a number of PhD supervisory efforts involve staff from both LCC and CC faculty. Third, among the six new staff members that LCC has hired since the breakup of LCC and CC, two individuals have particular expertise in computational social science, a hiring strategy that brings needed expertise within the reach of interdisciplinary initiatives that continue. Fourth, LCC faculty form partnerships with staff from other programmes at Tilburg University with data science expertise. Fifth, LCC and CC faculty continue to apply together to grant proposals.

LCC has been responsive to its previous review in a number of respects. It has made efforts and succeeded in attracting more and more varied funding sources, enhanced its focus on translating research onto applications of societal concern (examples of which include the creation of a chair that is endowed by industry major, and grants from other companies and foundations), and adjusted the staff's teaching efforts to support research more effectively.

4.3 Societal relevance

LCC's research tends to focus on theory development and application in order to understand and explain social phenomena, as is traditional in humanities and social sciences. This is an appropriate and meaningful approach to social research, rather than the creation of products or applications as is common in more engineering-oriented programmes. In that respect, LCC is impressive in terms of maintaining a focus on foundational issues that underlie cognition and communication as well as the application and examination of basic theories to topics of great societal interest and relevance. More specifically, LCC research includes fundamental "building blocks" of communication such as nonverbal communication and language. While many departments of communication internationally have forsaken these foundations in favour of more trendy topics, LCC research continues to address them successfully.

LCC acts on societal relevance along different dimensions. The researchers collaborate with companies, part of which happens in EU/National grants. LCC has also established collaboration with non-governmental organisations such as IKNL (Netherlands Cancer Registry) and hospitals.

LCC chose to present its societal impact along the three impact themes Tilburg University has provided. In particular, LCC has decided to strengthen its research in the application domain of eHealth which offers good opportunities to connect with the University Impact Theme "Enhancing Health and Well-being'. Two professors have joined the lab with expertise in digital health communication and in eHealth applications for elderly. LCC has conducted research that has a direct societal impact. It is attested by the collaboration it has with hospitals and the grants (NWO ZonMW, PhD funding, NWO Exact Sciences) it got. The NWO Exact Sciences funded project will have access to a very large number of data of cancer patients to develop model to tailor personalised treatment options. If successful, it could have direct impact on many patient's treatment.

The chair in "eHealth and data science" is also an important sign of excellent activity and with high potential to have strong societal impact.

A start-up company, flow.ai, which focuses on developing conversational artificial intelligence, has been created from research conducted at LCC by a PhD alumnus. It is an interesting valorisation of the work and a sign of innovation. The start-up has won the best start-up prize. It maintains strong connections with LCC as the initiator continues to spend 1 day a week in the lab.

More broadly, LCC's considerable research activity shows leadership and potential impact to society in several domains. For example, its research on people's abilities to visualise climate change aims directly at the translation of science into publicly understandable knowledge. LCC's abundant research on interactive digital communication positions LCC at the leading edge of communication research and addresses topics that occupy societal concern over the beneficial and detrimental effects of human interaction via the Internet, a focus that has led to occasional public presentations over controversies in digital life. Recent investments in research on eHealth and apps promoting healthy behaviour, as well as social robotics, further enhance the social relevance of LCC research now and in the future. The investment of corporations and foundations in endowed positions and research funding further epitomise the relevance of LCC research to societal concerns. Sponsorship by external organisations for at least 60 students' research projects conducted in its Communication and Information Sciences teaching programme also attests to relevance.

The researchers present their findings and insights, on occasion, in the popular media, in which they discuss topics relevant to society (e.g., the place of robots in society and education, the role of social media)., LCC actively uses social media professionally and writes popular science books intended for a broader audience . During the site visit, one of the assistant professors described some interesting examples of his professional social media use and work for public readers. However, LCC appears not to have made outreach or public presentation a top priority, which is in line with its focus on humanities and social science approaches. To ask for a shift in its activities toward outreach (in the form, possibly, of textbooks or web-based guides) would represent a significant change in strategy and may require the addition of personnel with different professional training and professional objectives than the academic staff have been cultivating. The university's public relations unit might be more aggressive in promoting the work of this programme to the public, aside from the occasional conveyance of press inquiries it has tendered. Despite the primary focus on scholarship, LCC is impressive in terms of its involvement in hospitals, NGOs, and provincial government, as well as the aforementioned partnerships with industry.

4.4 Viability

The number of scientific staff has grown during the reviewed period, going from 43 in 2012 (19,7 FTE, of which 28 people representing 9.6 FTE were permanent) to 61,5 in 2017 (23,2 FTE, of which 40 people, or 11.4 FTE were permanent). The increase of staff allows LCC to tackle more research questions, but also to strengthen some. It is also a positive sign of attractiveness. It has acquired more grants, some very competitive (e.g., ERC, H2020, NWO VENI, NWO VICI). Some of these grants are individual awards but other are collaborative ones. They are a strong sign that the researchers are respected in their field, and that LCC is internationally visible.

As indicated in the SWOT, several new faculty members have joined the programme. On the one hand, these additions offer new expertise, new research possibilities, new collaborations, and so on. The addition of large numbers of staff can also be a challenge, in regard to the management of the careers of these new faculty members. However, LCC has shown that its increase in numbers coincides with increased article production, indicating that it has attracted high-quality researchers who bring momentum with them. Furthermore, meetings with programme members during the site visit, indicate that assistant professors feel very strongly supported and are energetically pursuing their research. Some new researchers have noted that it would be very valuable if research assistance in the form of PhD students or postdocs were to be made available to them prior to the prospective award of the kinds of grants that typically subsidise such assistance, so that their research could continue prosperously and that they could prepare grant applications more successfully. This is not an unreasonable desire and if the university can provide such "start-up" assistance to new faculty it would be beneficial.

Another strength of LCC is the interdisciplinarity of its faculty members, who come from very different areas—computational linguistics, communication studies, and cognition. It allows LCC to study communication from a variety of perspectives. It is highlighted by the research questions that are driving the research agenda of LCC (understanding the cognitive process, understanding the differences between face-to-face and mediated communication, measuring impact of digital communication, building communicative skills into robots, etc.).

The LCC has performed a model job of increasing and diversifying sources of grant funding. Although funding cycles are never certain, the priority LCC has put on this activity promises to help sustain it in the future. These accomplishments are reflected in its larger unit attracting Center of Excellence support. The unit's development of grant acquisition planning procedures are innovative and apparently successful, and the addition of grant acquisition officers and other resources appears to be effective. The programme has secured funding at all levels of NWO and KNAW as well as competitive European Commission grants, and industry partnerships.

During meetings with faculty at the site visit a concern surfaced that there could be more help for faculty in identifying industry partners to be aligned with grant applications. However, later meetings with LCC leadership indicated that such help is available through university-level grant development support. Either these services might be improved or their availability should be made more salient to faculty.

Although LCC has been notably successful in attracting more and more varied grants, and its level of funding is improving, the committee noted that its overall level of external funding could continue to improve. 70% of the research funding currently comes from the university and 30% from external funding agencies, including contract research. An increase in external funding would enhance the unit's viability. The committee learned that faculty are well aware of these kinds of challenges, as well as the challenge of pursuing additional funding while maintaining as great a commitment to teaching as they do. The committee's sense is that LCC is by and large a young faculty doing everything right, moving in promising directions, and if they continue this way, then they will maintain their position among the leading programmes internationally.

The LCC's involvement in TiU's research impact themes seems variable but strong. The self-evaluation's SWOT report acknowledges that its approach to the health and well-being theme seems to focus substantially on its newly developed focus on eHealth, which it describes as being in early stages of development and hopes to enhance with additional hires. This strategy is commendable. It might be complemented by consideration of additional forms of well-being, as the unit's strong work related to climate communication and mediated interpersonal communication can also include aspects of planetary and psychosocial well-being (respectively) as part of both health and well-being as well as "resilient society". These components seem to be implicit in much of the research that LCC produces, and could be made more explicit should researchers wish to include additional assessments of and connections to such concerns in their work.

It is not clear whether the LCC programme occupies a particular niche among comparable units at other Dutch universities or internationally, or whether such identification is sought or desired. Tilburg University's LCC is recognised as among the strong communication research programmes internationally. One area in which greater prominence could be achieved within the Netherlands and internationally relates to how LCC promotes its integration of computational research methods in its research and instruction. The emphasis for future development reflected in the self-evaluation report seems to focus on broadening the areas of research and teaching, and collaborating actively with other scholars. Less was said in the self-evaluation report about transformations taking place in the methodologies and research technologies of the existing disciplines and how LCC may embrace those in its future research emphases, curricula, and doctoral training. However, as the committee learned on site, these kinds of development are actively being promoted with the addition of junior faculty members who have added new methodological and computer science skill sets to the traditional and novel theoretical questions that various disciplines explore, and through collaborations with other units and universities. At the same time, trends in the field of communication and linguistics suggest that the opportunity for an academic programme to distinguish itself from others by an academic focus on technology and the use of computational methods in its research may be short-lived, as more and more departments are hiring new faculty with such expertise and incorporating these trends into their own research at a growing rate. Tilburg's LCC should judiciously consider what it must do to maintain this distinctiveness, to maintain international leadership and visibility in it, and what else it wishes to be known for when the current approach no longer connotes innovation and uniqueness.

4.5 PhD Programme

The level of activity PhD candidates display and their joint supervision by several staff members promote high quality graduates, and a variety of support programmes (e.g., monthly meetings among the cohorts, and reading and discussion groups) enhance their experience. The PhD thesis is based on journal papers. It ensures the student has published his/her work in good venue and that the work has been accepted by peers. It is a good sign of research quality. The practice to put PhD students as first author in publications related to the dissertation is praiseworthy. It gives visibility to PhD students offering them a springboard for the future. The PhD graduates produce a good number of scientific publications as part of their theses, and have earned faculty research positions at prestigious Dutch and international universities.

The committee is concerned about the inordinate amount of time for PhD students to complete their PhD thesis. Only 12% finish in four years. After five years, 47% have received their degrees. This percentage includes candidates (12%) who have obtained a doctorate within 4 years or earlier. After seven years, in total 53% of the candidates completed their PhD. It is important to find ways to improve the completion rates for PhD candidates, without compromising the quality of PhD projects and the final dissertations.

Most of PhD students remain in academics. This is remarkable. Some go to industry. The admission procedure is fine: while it gives chances to internal students, it is open to external ones. For students that wish, the faculty helps to write proposals on their research topics and to submit them to NWO or ERC.

All PhDs are co-advised by two faculty members. This approach enhances their ability to conduct interdisciplinary research. They have regular meetings with their advisors and with their peers. The "PhD Day" is another innovation that enhances visibility of each PhD working in the labs.

4.6 Research integrity

LCC appears to be appropriately involved in the University's efforts on responsible data science, both in terms of contributing to university strategy and protocol development, and in terms of individuals' efforts toward open science and data-sharing in their individual research projects. LCC promotes open access journals and open source work (through OSF).

All research complies with ethical values defined by the Research Ethics and Data Management Committee of the Tilburg School of Humanities and Digital Sciences. The researchers of LCC participated actively in the setting up of this committee.

Since the research conducted in LCC relies a lot on various corpora and other data, a lot of attention is paid to data management. It is interesting that all PhD students were aware of this issue and that they learned best practices.

The committee was impressed to learn that one measure LCC takes as part of its education of PhDs is to promote replication of others' experimental studies as a PhD's first research effort. This is a very strong approach to methodological learning, as well as a way to implant a strong value for research integrity from the beginning of a PhD's postgraduate education.

4.7 Diversity

LCC's self-evaluation report reports a mixture of men and women and diversity of the age of faculty. It also celebrates the recent promotion of two female full professors. The self-evaluation report mentions an open and inclusive environment. Meetings with faculty during the site visit brought no particular tensions or gaps to the surface.

LCC is led by two full professors, one female and one male.

The LCC faculty acknowledges a Belgian and an American national among its ranks. It does not seem attuned to concerning itself with greater racial or ethnic diversity. So far, it has mainly focused on reaching appropriate levels of gender and age diversity among the faculty members; which also seems to be the top priority of the University of Tilburg regarding diversity. As LCC researchers expand their efforts in the direction of health communication, and encounter systematic disparities in the provision of health-

related services and information among different social groups, they may wish to consider further whether it will behove them to secure researchers with more varied backgrounds.

4.8 Recommendations

The committee invites the programme to consider the following suggestions:

- LCC should engage in long-range strategic reflection about its primary scientific objectives in order to strengthen the national and international awareness of its interdisciplinary niche among similar institutes, and to prepare for future strategic profiling of the programme as the disciplines of language, communication, and computational social science experience greater convergence in the coming decade.
- Continue successful efforts to increase external funding.
- Look for ways to assist new faculty members with research support (PhDs or postdocs) as "start-up" costs to assist them in the continuation of their research while they prepare initial grants.
- University-level efforts at public relations/media relations can involve more "translational" writers to more aggressively promote the work of LCC to the public via popular media and social media.
- Information should be systematically propagated on the university resources available to help faculty identify industry partners as part of their development of national-level grant proposals.
- The completion timetable rates for PhD candidates must be improved, without compromising the quality of PhD projects and the final dissertations.

Appendix A – Curriculum Vitae

John Nerbonne (MSc., PhD Ohio, 1984) worked at Hewlett-Packard Labs and the German Research Center for Artificial Intelligence before becoming professor of digital humanities in Groningen in 1993 (now emeritus). His research focuses on machine learning and computational techniques for studying language variation, and he has published extensively in these areas, but also in a wide range of other topics in computational linguistics. He has had visiting appointments as professor or researcher in Stanford (1985-90), Saarbrücken (1991-92), Nippon Telephone and Telegraph Labs (Yokosuka, 1997), *Musée de L'Homme* (Paris, 1998, *inter alia*), Stuttgart (2002), MIT (2005), Tübingen (2006) and the Freiburg Institute for Advanced Study (FRIAS, 2012-2014). Nerbonne served as president of the Association for Computational Linguistics in 2002, joined the Royal Netherlands Academy of Arts and Sciences (KNAW) in 2005, was the American Dialect Society professor at the 2005 Linguistics Institute of the Linguistics Society of America, and received the Humboldt research prize in 2013. He has been an honorary professor in Freiburg since 2014. See www.let.rug.nl/nerbonne/10

Arthur C. Graesser (PhD University of California, San Diego, 1977) is a professor in the Department of Psychology and the Institute of Intelligent Systems at the University of Memphis, as well as an Honorary Research Fellow at University of Oxford. His research interests are in the cognitive, learning, and discourse sciences. He served as editor of the journal ***Discourse Processes*** (1996–2005) and ***Journal of Educational Psychology*** (2009-2014), as well as presidents of 4 societies, including Society for Text and Discourse (2007-2010), the International Society for Artificial Intelligence in Education (2007-2009), and the Federation of Associations in the Behavioral and Brain Sciences (2012-13). He and his colleagues have developed and tested software in learning, language, and discourse technologies, including those that hold a conversation in natural language and interact with multimedia (such as AutoTutor) and those that analyze text on multiple levels of language and discourse (Coh-Metrix and Question Understanding Aid -- QUAID). He has served on four panels with the National Academy of Sciences and four OECD expert panels on international assessments of problem solving.

Joseph B. Walther (PhD Arizona, 1990) is the Mark and Susan Bertelsen Presidential Chair in Technology and Society, a Distinguished Professor of Communication, and Director of the Center for Information Technology and Society at the University of California, Santa Barbara. His research focuses on computer-mediated communication in personal relationships, groups, and inter-ethnic conflict, to which he has contributed several original theories and numerous empirical studies. He has held visiting or permanent appointments in Communication, Psychology, Information Science, and Education & Social Policy in the US (Cornell, Northwestern, etc.), Europe (Manchester University, University of Amsterdam, University of Duisburg-Essen), and Asia (Nanyang Technological University Singapore). He is a Fellow of the International Communication Association (ICA) and a Distinguished Scholar in the National Communication Association (NCA). He has twice been awarded the NCA Woolbert Award for articles that have stood the test of time and changed thinking in the communication discipline for more than ten years.

Catherine Pelachaud (PhD Pennsylvania, 1991) is Director of Research at CNRS in the laboratory ISIR, Sorbonne University. Until 2002, she was professor at University Paris 8. Her research interest includes socio-emotional embodied conversational agent, nonverbal communication and human-machine interaction. She has been involved and is still involved in several European projects related to believable embodied conversational agents, emotion and social behaviours. She is associate editors of several journals among which IEEE Transactions on Affective Computing, ACM Transactions on Interactive Intelligent Systems and Journal on Multimodal User Interfaces. She has co-edited several books on virtual agents and emotion-oriented systems. She participated to the organisation of international conferences such as IVA, ACII and AAMAS, virtual agent track. She is recipient of the ACM – SIGAI Autonomous Agents Research Award 2015 and was honoured the title Doctor Honoris Causa of University of Geneva in 2016. Her Siggraph'94 paper received the Influential paper Award of IFAAMAS (the International Foundation for Autonomous Agents and Multiagent Systems).

Appendix B - Programme of the site visit

Wednesday 13 December 2018

17.00-19:00	Preparatory committee meeting	Committee members

Thursday 14 December 2018

Time		
8.30 - 9.00	**Meeting with the Rector Magnificus and TSHD board**: Welcome, introduction, strategic research policy Prof.dr. Emile Aarts, Rector Magnificus Prof.dr. Wim Drees, Dean TSHD Prof.dr. Marc Swerts, Vice-Dean of Research TSHD mr. Cécile de Vos, Managing Director TSHD	
9.00-9.45	**Meeting Research Advisory Board:** Research management and quality care Prof.dr. Marc Swerts, Chair Research Advisory Board Prof.dr. Emiel Krahmer, Programme Leader LCC Prof.dr. Max Louwerse, Programme Leader CC Prof.dr. Eric Postma, Programme Leader CC Prof.dr. Juliette Schaafsma, Programme Leader LCC	
9:45-10:00	Break	committee
Parallel session 1: junior and senior staff		
10:00-10:45	**Meeting with junior and senior staff CC** dr. Afra Alishahi dr. Andrew Hendrickson dr. Henry Brighton dr. Maryam Alimardani dr. Marie Postma dr. Travis Wiltshire	**Meeting with junior and senior staff LCC** dr. Mariek vanden Abeele Prof.dr. Marjolijn Antheunis dr. Neil Cohn dr. Martijn Goudbeek dr. Ruud Koolen dr. Alwin de Rooij
10:45-11:00	Break	
Parallel session 2: programme leaders		
11:00-11:45	**Meeting with programme leaders of the research programme CC** Prof.dr. Max Louwerse Prof.dr. Eric Postma	**Meeting with programme leaders of the research programme LCC** Prof.dr. Emiel Krahmer Prof.dr. Juliette Schaafsma
11:45-12:15	Time for deliberation	
12:15-13:00	Lunch (Faculty club)	
Parallel session 3: PhD candidates		
13.00-13:30	**Meeting with PhD candidates CC** A.Tinga C.D. Emmery M. de Haas M.R. Dias Da Silva P.A. Blomsma	**Meeting with PhD candidates LCC** Debby Damen Marlies de Groot Annemarie Nanne Ruben Vromans Jan de Wit
Parallel session 4: (lab) presentations		
13:30 -14:30	**Overview research CC:**	**Demo's + Lab visits LCC:** Round Tour LCC Labs [dr. Rein Cozijn]

	DAF Technology Lab, Jheronimus Academy of Data Science, Mind Labs	"Play hints with a robot" demo [Jan de Wit] ERP lab demo [dr. Neil Cohn]
14.30 - 15.30	Time for deliberation	
15.30 - 16:00	**Meeting with TSHD board:** Presentation of preliminary findings Prof.dr. Wim Drees, Dean TSHD Prof.dr. Marc Swerts, Vice-Dean of Research TSHD mr. Cécile de Vos, Managing Director TSHD	
16.00-17:30	Time for deliberation	
17:30	Informal presentation preliminary findings Drinks in Dante Foyer	

Appendix C – Tables

Table 1.1 Number of staff and research fte - CC

	2012		2013		2014		2015		2016		2017	
	#	fte	#	fte	#	fte	#	fte	#	fte	#	fte
Scientific staff	13	2.82	15	3.99	14	3.59	14	3.15	22.5	4.63	23.5	6.5
Post-docs	4	1.84	2	0.80	2	0.95	3	0.87	4.5	2.32	5	2.29
PhD students	10.5	7.38	11.5	7.81	8.5	6.82	9	6.52	14	6.03	12.5	7.73
Total research staff	**17.5**	**12.04**	**28.5**	**12.6**	**24.5**	**11.36**	**26**	**10.54**	**41**	**12.98**	**41**	**16.52**

Table 1.2 Funding- CC

	2012		2013		2014		2015		2016		2017	
Funding	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**
Direct funding	6.05	50	6.33	50	8.93	79	7.19	68	6.92	53	10.55	64
Research grants	3.89	33	4.18	33	0.97	9	2.24	21	2.23	17	1.65	10
Contract research	2.10	17	2.10	17	1.46	12	1.11	11	3.83	30	4.32	26
Other	-	-	-	-	-	-	-	-	-	-	-	-
Total funding	**12.04**	**100**	**12.61**	**100**	**11.36**	**100**	**10.54**	**100**	**12.98**	**100**	**16.52**	**100**
Expenditure *	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**
Personnel c.	16502	91.7	16341	93.9	17641	93.9	14502	91.6	13561	90.8		
Other costs	1499	8.3	1067	6.1	1153	6.1	1331	8.4	1373	9.2		
Total costs	**18001**	**100**	**17409**	**100**	**18794**	**100**	**15833**	**100**	**14934**	**100**		

* Due to the recent division of the department into two departments, this information is only available at the level of the former department

Table 1.3 Main categories of research output – CC

	2012	2013	2014	2015	2016	2017
Refereed articles	12	13	6	15	9.5	16
Non-refereed articles	0	0	1	1	0	0
Books	0	1	2	2	0	0
Book chapters	8	3	4	3	2	2.5
PhD theses	4	4	1	2	3,5	4
Conference contributions	32	33	39	25	32	24.5
Professional publications	5	0	0	0	4.5	0
Publications aimed at the general public	0	0	0	0	0	0
Other research output						
Comment/letter to editor	0	0	1	0	0	0
Editorial	0	0	1	0	0	1
Special issue	0	0	1	0	0	0
Book editing	3	3	1	1	2	1
Meeting abstract	0	0	0	0	2.5	0
Conference paper	0	1	2	0	2	4
Conference poster	0	0	2	1	0.5	1
Conference abstract	0	0	3	3	0	2
Inaugural speech	1	0	1	0	0	1
Working paper	0	0	1	0	0	0
Software	0	1	1	0	0	0
Patent	0	0	0	0	1	0
Dataset/databasse	0	0	3	0	0	1
Total publications	**65**	**59**	**70**	**53**	**61.5**	**58**

Table 1.4 PhD candidates CC

Enrollment (1)																
Starting year				**Graduated in year 4 or earlier**		**Graduated in year 5 or earlier**		**Graduated in year 6 or earlier**		**Graduated in year 7 or earlier**		**Not yet finished**		**Discontinued**	
	M	**F**	**M+F**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
2009*	2	1	3	0	0	1	33.3	1	33.3	2	66.7	0	0	1	33.3
2010	1	1	2	0	0	0	0	0	0	0	0	0	0	2	100
2011*	4	0	4	0	0	0	0	1	25	1	25	1	25	2	50
2012	2	1	3	0	0	0	0	1	33.3	1	33.3	2	67	0	0
2013	1	1	2	2	100	2	100	2	100	2	100	0	0	0	0
Total	**10**	**4**	**14**	**2**	**14.29**	**3**	**21.43**	**5**	**33.7**	**6**	**42.86**	**3**	**21.4**	**5**	**35.71**

1) All PhD candidates conducting research with the primary aim/obligation of graduating, based on 0.8-1.0 FTE contract. This includes PhD candidates with employee status (AiO/promovendi) and contract PhD candidates without employee status, receiving external funding or a university scholarship, who are conducting research under the authority of the research unit with the primary aim of graduating (beurspromovendus).

* Indicates PhD candidate joint CC - LCC (2 male PhD candidates, one in 2009 and one in 2011 respectively)

Table 2.1 Number of staff and research fte - LCC

	2012		2013		2014		2015		2016		2017	
	#	fte	#	fte	#	Fte	#	fte	#	fte	#	fte
Scientific staff	28	9.6	30	9.45	27	9.24	31	8.97	36.5	8.43	39.5	11.37
Post-docs	3	1.53	7	3.04	5	3.04	4	1.62	2.5	0.36	3	1.75
PhD students	12	8.60	12	9.35	11	8.88	12	7.50	17	9.90	19	10.07
Total research staff	**43**	**19.73**	**49**	**21.84**	**43**	**21.16**	**47**	**18.09**	**56**	**18.69**	**61.5**	**23.19**

Table 2.2 Funding- LCC

	2012		2013		2014		2015		2016		2017	
Funding	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**
Direct funding	14.11	72	16.71	77	16.43	78	14.33	79	12.83	69	16.41	70
Research grants	5.37	27	4.81	22	4.06	19	3.70	21	4.51	24	3.84	17
Contract research	0.25	1	0.32	1	0.67	3	0.06	1	1.35	7	2.94	13
Other	-	-	-	-	-	-	-	-	-	-	-	-
Total funding	**19.73**	**100**	**21.84**	**100**	**21.16**	**100**	**18.09**	**100**	**18.69**	**100**	**23.19**	**100**
Expenditure*	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**	**€*100**	**%**
Personnel c.	16502	91.7	16341	93.9	17641	93.9	14502	91.6	13561	90.8		
Other costs	1499	8.3	1067	6.1	1153	6.1	1331	8.4	1373	9.2		
Total costs	**18001**	**100**	**17409**	**100**	**18794**	**100**	**15833**	**100**	**14934**	**100**		

* Due to the recent division of the department into two departments, this information is only available at the level of the former department

Table 2.3 Main categories of research output – LCC

	2012	2013	2014	2015	2016	2017
Refereed articles	28	33	29	24	46	47
Non-refereed articles	0	0	0	0	1	1
Book chapters	9	6	5	3	8	10
PhD theses	1	4	2	3	4	1
Conference contributions	37	38	40	25	23	13
Professional publications	8	2	4	1	4	1
Publications aimed at the general public	0	0	0	0	1	1
Other research output						
Comment/letter to editor	0	0	0	0	0	1
Literature review	0	0	1	0	0	0
Editorial	0	0	0	0	2	1
Meeting abstract	0	0	0	0	4	0
Entry for encyclopaedia/dictionary	0	0	0	0	1	0
Book/film/article review	0	1	0	0	0	0
Conference paper	0	0	4	2	5	8
Conference poster	0	1	6	2	6	1
Conference abstract	0	0	10	7	9	9
Conference other contribution	0	0	0	0	0	1
Software	0	0	1	0	0	0
Web publication/site	0	0	0	0	0	1
Total publications	**83**	**85**	**102**	**67**	**114**	**96**

Table 2.4 PhD candidates LCC

Enrollment (1)																
Starting year				Graduated in year 4 or earlier		Graduated in year 5 or earlier		Graduated in year 6 or earlier		Graduated in year 7 or earlier		not yet finished		Discontinued	
	M	F	M+F	#	%	#	%	#	%	#	%	#	%	#	%
2009*	4	1	5	0	0	5	100	5	100	5	100	0	0	0	0
2010	0	1	1	0	0	1	100	1	100	1	100	0	0	0	0
2011*	3	2	5	0	0	1	20	2	40	2	40	3	60	0	0
2012	1	2	3	0	0	1	33.3	1	33.3	1	33.3	2	66.7	0	0
2013	0	3	3	2	66.7	0	0	0	0	0	0	3	100	0	0
Total	**8**	**9**	**17**	**2**	**11.76**	**8**	**47.06**	**9**	**52.94**	**9**	**52.94**	**8**	**47.06**	**0**	**0**

1) All PhD candidates conducting research with the primary aim/obligation of graduating, based on 0.8-1.0 FTE contract. This includes PhD candidates with employee status (AiO/promovendi) and contract PhD candidates without employee status, receiving external funding or a university scholarship, who are conducting research under the authority of the research unit with the primary aim of graduating (beurspromovendus).

* Indicates PhD candidate joint CC - LCC (2 male PhD candidates, one in 2009 and one in 2011 respectively)

Appendix D – Meaning of the scores

Category	Meaning	Research quality	Relevance to society	Viability
1	World leading/ excellent	The research unit has been shown to be one of the few most influential research groups in the world in its particular field	The research unit makes an outstanding contribution to society	The research unit is excellently equipped for the future
2	Very good	The research unit conducts very good. internationally recognised research	The research unit makes a very good contribution to society	The research unit is very well equipped for the future
3	Good	The research unit conducts good research	The research unit makes a good contribution to society	The research unit makes responsible strategic decisions and is therefore well equipped for the future
4	Unsatisfactory	The research unit does not achieve satisfactory results in its field	The research unit does not make a satisfactory contribution to society	The research unit is not adequately equipped for the future