



**Maynooth
University**
National University
of Ireland Maynooth

Ollscoil Mhá Nuad

Maynooth University

QUALITY IMPROVEMENT AND ASSURANCE

PEER REVIEW GROUP REPORT

COMPUTER SCIENCE

ACADEMIC YEAR 2019

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1. Introduction

This report summarises the outcomes of a Quality Improvement and Assurance assessment of the Department of Computer Science at Maynooth University, held in April-May 2019. The assessment was carried out by an appointed Peer Review Group comprising both external and internal reviewers and addresses all aspects of the Department's activities: teaching and learning, research and scholarship, and service and outreach both within the University and to other communities. The assessment is based on analysis of a Departmental Self-assessment Report and meetings held with the Head and Deputy Head of Department, the Faculty Dean, staff of the Department (academic, technical, and administrative), groups of undergraduate and postgraduate students, and representatives of other University departments and services that interact significantly with the Department.

For much of the period since the last Quality Review of the Department was undertaken in 2009, severe restrictions have been in place on the hiring of new staff into the Higher Education sector. However, recruitment of new staff into the Department recommenced in 2017, and the Department currently has a total of 30 academic staff (4 of whom are currently on leave for 2018-2019):

- Head of Department
- Deputy Head of Department
- 6 Professors (including 1 currently on leave)
- 6 Senior Lecturers (including 1 currently on leave)
- 14 Lecturers (including 2 currently on leave)
- 2 Assistant Lecturers

Three of the academic staff (2 Professors and one Senior Lecturer) are seconded full-time to research institutes/centres within the University, whilst another Professor is engaged primarily in an institutional role. Some of the recently appointed staff are in fixed-term positions, supported by HEA Springboard funding.

Technical support for the Department is provided by 4 staff, including a Chief Technical Officer and a Senior Technical Officer; administrative support is provided by a Departmental Administrator and two Executive Assistants.

In July 2015 the Department relocated to new facilities in the Eolas building, constructed with funding from PRTL cycle 5. Here the Department is adjacent to IT services, three research institutes, and the business incubation centre Maynooth Works. The Eolas building provides an open and welcoming environment, with good laboratory facilities for both undergraduate and postgraduate students and well-appointed staff offices. The Department also retains some of the laboratory space in its former home in the Callan building.

Teaching and Learning

Since the last Departmental Quality Review in 2009, there have been a number of curriculum developments, some driven by University-wide restructuring of first-year programmes and some arising from initiatives within the Department. The Department's Bachelor in Computer

Science and Software Engineering (CSSE) remains the primary dedicated entry degree into the Computer Science discipline; this is a four-year programme, including an industrial work placement, and may be accessed through either the Arts or Science faculties. The Bachelor in Multimedia, Mobile and Web Development also comprises predominantly Computer Science (and Multimedia) modules and is also available through both the Arts or Science faculties.

A range of programmes previously involving a major component of Computer Science, or including modules taught by Computer Science, is now accommodated by the University's general science degree and general arts degree. The previously popular BA in Music Technology is an example. Students may take Computer Science as part of a four-year Science Degree or as part of a three-year Arts Degree; in the Science Degree, a choice of pathways is available at the ends of the first and third years; in the Arts Degree, at the end of the first year students may choose their preferred pathway from a broad range of options.

Since 2009 the Department has introduced new dedicated programmes: the BSc in Computational Thinking (in 2013), an accelerated three-year programme with a theoretical focus designed for students with strong ability in mathematics and interests in logic and philosophy; and the BSc in Robotics and Intelligent Devices (in 2016), a joint programme with the Department of Electronic Engineering with a focus on applications. Most recently, in 2019 the Department has introduced the BSc in Mathematics and Computer Science (with Education), aimed at students planning to qualify as second level teachers in Mathematics and Computer Science through the follow-on Professional Master of Education. The Department is also active in new programmes led by other departments: the new BSc in Data Science and BSc in Quantitative Finance are both due to commence in September 2019.

Undergraduate programmes with a major component of Computer Science:

- BSc Computer Science and Software Engineering (CSSE)
- BSc Multimedia Mobile and Web Development
- BSc Science (including Computer Science)
- BA Arts (including Computer Science)
- BSc Computational Thinking
- BSc Robotics and Intelligent Devices
- BSc Mathematics and Computer Science (with Education)

The Department offers both conversion courses and Masters programmes for postgraduate students. The Higher Diploma in IT, a conversion course intended for graduates whose primary degree is not in Computer Science or Information Technology, is being discontinued in favour of the one-year Higher Diploma in Science (Software Development), which was introduced in 2015. The HD Science (SD) is designed to convert non Computer Science graduates to software developers with programming skills to the standard for industrial accreditation; each year it has been funded by the HEA Springboard programme, and the Department has submitted a successful funding proposal for continuation in 2019-20.

For Computer Science graduates, the MSc in Computer Science (Software Engineering) has been running for over 20 years. To accommodate changes in the typical student cohort from local industry-based students to international students, from 2019 the course has been

compacted into a one-year programme without placement from a 2-year programme that included a 6-month work placement. In 2016 the Department introduced the new MSc in Computer Science (Applied), a 2-year programme including a substantial individual software project and a 6-month work experience placement in a software company. From 2012 to 2017 the Department also ran the Erasmus Mundus Double MSc in Dependable Software Systems (DESEM), jointly with St. Andrew's University in Scotland and Université Henri Poincaré in Nancy, France. This was a 2-year programme in which each student spends a year at each of two of the three universities. Following on, in 2018 the Department applied successfully for similar funding for three student cohorts on the Erasmus Mundus Joint MSc in Advanced Systems Dependability (DEPEND), jointly with St. Andrew's University and Université de Lorraine in Nancy. The Department also contributes to postgraduate programmes led by other departments

Postgraduate programmes in Computer Science:

- MSc Computer Science (Software Engineering)
- MSc Computer Science (Applied)
- Erasmus Mundus Double MSc in Advanced Systems Dependability (from 2018)
 - Erasmus Mundus Joint MSc in Dependable Software Systems (2012-2017)
- Higher Diploma in Science (Software Development)
- Higher Diploma in Information Technology (discontinued)

Since 2009 the numbers of students enrolled on programmes with a major component of Computer Science has varied significantly from year to year, with underlying trends of significant growth on both undergraduate and postgraduate programmes. Overall first-year undergraduate enrolments have risen continuously from 195 in 2009 to a peak of 441 in 2015, but have settled to a more consistent level over the last three years, averaging 288 between 2017 and 2019. From an average of 26 between 2009 and 2011, first-year enrolments on the BSc CSSE have more than tripled to an average of 86 between 2017 and 2019. Corresponding combined figures for Computer Science as part of the general arts and general science degrees have almost doubled from 59 to 107. In recent years, an additional 28 students each year (average between 2017 and 2019) have enrolled on the BSc in Robotics and Intelligent Devices. Correspondingly, the overall numbers of students in Computer Science in the second and fourth years have more than doubled and more than trebled, respectively, from 110 and 30 (averages between 2009 and 2011) to 242 and 108 (averages between 2017 and 2019).

Taught postgraduate enrolments have also varied greatly from year to year: on the long-standing MSc in Computer Science (Software Engineering), from 11 in 2009 to a peak of 16 in 2014, but then falling to as low as just 1 in 2018. However, the revised one-year format in 2019 has seen a revival to 12. The more recent MSc in Computer Science (Applied) has averaged an intake of 6 in its first three years (2017-2019), though again with large variation. The Erasmus Mundus Double MSc in Dependable Software Systems has brought an additional 10 students (on average) each year to the Department (first and second years combined). For postgraduate conversion courses, the Higher Diploma in IT averaged an intake of 24 between 2009 and 2015, peaking at 38 in 2013. With the Higher Diploma in IT now discontinued, the Higher Diploma in Science (Software Development) has been a successful replacement,

averaging an intake of 33 since its introduction in 2016, with 37 students in each of 2018 and 2019.

Immediately prior to 2009, the Department's student-staff ratio was at a low-point of 10, with correspondingly low income calculated according to student FTEs. This situation presented threats to the retention of facilities and staff, and constraints on future planning. Since 2009, the Department has operated in an environment of significant expansion, but fluctuation, in student numbers and, until recently, restrictions on the hiring of new staff into the Higher Education sector. Such expansion without staff recruitment resulted by 2015-16 in a student-staff ratio of 28.4, well above the Faculty average. Coupled with increasing diversity in the student cohorts studying Computer Science, and a gradual but significant reduction in the CAO entry points on all of the main programmes involving Computer Science, such high student-staff ratios brought new challenges to the Department in providing support for students and maintaining quality and workloads. With stabilisation of student numbers within the last three years, University-wide restructuring of first-year programmes, and recommencement of staff recruitment in 2017, the Department's student-staff ratio of 23.2 in 2018/19 is now in line with sector norms.

Research and Scholarship

Prior to the last Quality Review of the Department in 2009, Computer Science staff had been involved in setting up research institutes and centres that remain central to the University's research strategy. In relation to the Department, the most significant of these is the Hamilton Institute. Currently two members of the Department are seconded full-time to the Institute, whilst 16 other academic staff members are affiliates of the Institute, taking advantage of laboratory space, facilities and infrastructure, and the support provided by the Institute's research environment. Another member of the Department is seconded full-time to the Science Foundation Ireland (SFI) National Centre for Geocomputation. Seven members of the Department are associated with the University's Assisted Living and Learn (ALL) Research Institute, and other individual staff members were associated with the digital humanities research institute An Foras Feasa and the SFI Research Centre CONNECT. Some members of the Department also collaborate with the national research centres ADAPT, Lero and Insight.

There are diverse research areas within the Department, spanning theoretical aspects of Computer Science, principles of programming, artificial intelligence and machine learning, computer vision, natural language processing; applications to robotics, digital holography, wireless sensors, and information retrieval; and inter-disciplinary research in neurological modelling, digital humanities, music technology, financial technology, and education. With some exceptions, this wide diversity means that research efforts within the Department tend to be individualistic and predominantly opportunistic.

Since 2009 the volume of research outputs *per annum* has been broadly similar to the previous 10-year period, with volatility due to variations over time in the numbers of postdoctoral researchers and postgraduate students in the Department. The output rate of journal articles has remained approximately constant, with an average of 26 each year, whilst the number of

conference publications has declined significantly from an average of 83 *per annum* in the period between 2009 and 2011 to 35 *per annum* between 2016 and 2018.

Research funding to the Department has been boosted by occasional successes from major SFI and HEA PRTL I initiatives; apart from these, since 2009 overall income to the Department from research grants has been modest, with only a few members of staff securing grant awards from EU FP7 and Horizon 2020 (3 awards, totalling €1.3M) or SFI (12 awards, totalling €3.8M).

Over the period since 2009 there has been a significant drop in the numbers of postgraduate students and postdoctoral researchers in the Department. The spike in postdoctoral researchers in the Department immediately prior to 2009 has dissipated, and the Department currently has none. Whilst some members of staff have been successful in securing postgraduate scholarships and postdoctoral fellowships from IRC, SFI and EU Marie Curie, the number of registered postgraduate students dropped gradually from 28 in 2009 to 19 in 2013, but has since recovered to 27 in 2018. On average, 6 new postgraduate students have joined the Department each year, and 3 have graduated each year with PhD. Postdoctoral students in the Department now follow a structured training programme, with formalised annual progress review and submission of a conversion thesis to confirm sufficient progress and an adequate plan to proceed to PhD study.

2. Peer Review Group Members

Name	Affiliation	Role
Professor Bryan Scotney	School of Computing, Ulster University	External Reviewer, and Chair
Professor Carol O’Sullivan	School of Computer Science & Statistics, Trinity College Dublin	External Reviewer
Professor Mary Gilmartin	Department of Geography, Maynooth University	Internal Reviewer
Professor Tom O’Connor	Arts & Humanities Institute, Maynooth University	Internal Reviewer

3. Timetable of the site visit

The dates for the site visit were set several months in advance by the University's Office for Strategy & Quality, and publicly accessible web links were provided to the last Quality Review of the Department (2009) and the Department's corresponding Quality Implementation Plan (March 2011). The Department's Self-assessment Report was made available approximately two weeks in advance of the site visit, followed in the week before the visit by further information in terms of guidance for the preparation of the Peer Review Group (PRG) report, a template for the PRG Report, and a draft timetable for the site visit.

The timetable for the site visit was developed by the Office for Strategy & Quality and is shown in Appendix 1. The schedule enabled the PRG to meet with all available members of the Department (academic, technical and administrative), groups of both undergraduate and postgraduate students, the faculty Dean, and representatives from selected departments that interact significantly with the Department. The PRG were also facilitated in viewing the Department's teaching and research laboratories, and staff and postgraduate student accommodation. As the schedule was very full and discussion often expansive, most of the meetings overran their allotted time. This was accommodated by shortening all of the scheduled breaks – the PRG considered it more important to give the participants, particularly Departmental staff and students, sufficient time to discuss issues fully than to adhere strictly to the published timetable. Within the timetable developed by the Office for Strategy & Quality, telephone calls with three external stakeholders had been scheduled. Due to pressures of time, the PRG decided to cancel these calls, as it felt that it was most important to allow Departmental staff and students to have the time necessary for full discussion (at the expense of the meetings over-running), and by the time that the calls were scheduled to take place the PRG was already satisfied with the Department's responses on topics that might have been discussed in the external stakeholder calls.

Overall, the timetable enabled the PRG to gain a thorough insight into all aspects of the Department. Sufficient time was also allocated for the PRG to compile and deliver an exit presentation on the final afternoon of the site visit. However, it would have been informative for the PRG to have also had the opportunity to meet with representatives from the Hamilton Institute and from the Offices of the University responsible for strategic and operational management of research at an institutional level.

4. Peer Review Methodology

4.1 Site Visit

At the start of the site visit the PRG agreed on an external reviewer as Chair. Smooth running of the site visit was facilitated by staff of the University's Office for Strategy & Quality. All participants in the meetings engaged fully in the review process and interacted openly with the PRG. No specific agendas for the meetings were set by the Office for Strategy & Quality; the PRG set the agenda items in each case, with flexibility to follow particular directions as interactions with participants evolved. All members of the PRG conducted the review process

in a spirit of facilitating the Department to recognise and articulate its strengths and weaknesses. The desired outcome is to empower the Department to make improvements that will enable it to determine and develop a strong way forward that takes full advantage of all of the talent, commitment and infrastructure available, and is responsive to evolving and new challenges and opportunities.

4.2 Preparation of the Peer Review Group Report

The PRG is based on an assessment of a combination of information from the Department's Self-assessment Report and from discussions with participants in the site visit meetings that were scheduled by the Office for Strategy & Quality. The agendas for those meetings were directed by the PRG, based on its identification of issues arising from the Self-assessment Report, on national and international benchmarks, and on recognised good practice in other institutions. The PRG report has been prepared in accordance with the Office for Strategy & Quality guidance document and uses the template provided.

At the end of the site visit, initial conclusions were delivered in an exit presentation to the Department, faculty Dean, VP Academic and Registrar, and representatives of the Office for Strategy & Quality. The summary assessment of the Department and the commendations and recommendations set out in Sections 5 and 6 of this PRG report were largely covered in the exit presentation. Some aspects have been expanded and some additional points identified, based on notes taken during the site visit meetings and as a natural part of the process of preparing the report. The initial draft of the report was compiled by the Chair of the PRG and revised with input from the other PRG members.

5. Overall Assessment

5.1 Summary Assessment of the Department

The Department is now housed in a well-designed space that facilitates collaboration. The Eolas building provides an encouraging environment for both students and staff, and good laboratory facilities with strong technical support that is appreciated by the students. During a sustained period of significant expansion in student numbers, the Department has demonstrated strengths in developing new undergraduate programmes, targeted at attracting students with a range of interests in different aspects of Computer Science. The Department has also shown initiative in developing an international postgraduate programme and a strong commitment to continued provision of conversion training to enable non-Computer Science graduates to enter the software development industry. Many of the Department's teaching staff are acknowledged by the students as helpful, highly professional, and dedicated, and the overall employability record of graduates is good. The Department strongly supports its students to engage in external competitive events and has also developed a strong record of outreach activities to promote participation in Computer Science.

Whilst the Department's contributions to the University are well recognised in many areas, its current management and organisational structures are not enabling the Department to function to its full potential, both internally and externally. This is evident both in a lack of transparency in operational management and a lack of strategic planning, particularly in recruitment, early career development for staff, and research activities. Associated threats in terms of funding and esteem arise from not expanding research capacity and collaborations, nor fulfilling the potential available from the areas of research excellence that exist in the Department. Within current organisational structures, there is a lack of agency felt by staff in directing their contribution to the Department and influencing its development. Current organisational structures within the Department are also not enabling quality assurance issues to be resolved effectively, nor quality assessment and enhancements to be planned and implemented regularly.

5.2 Self-Assessment Report

The Self-assessment report was prepared mainly by the Head and Deputy Head of Department, with the assistance of three committees set up and co-ordinated by them to gather data and carry out analysis. Information was gathered from central departments of the University, the Department's own records, surveys undertaken with undergraduate and postgraduate students, individual staff contributions (mainly for outreach activities) and external sources available on the Internet (mainly for the employment profiles of graduates). The report was compiled over a period of approximately four months prior to the site visit.

Compilation of a Departmental Self-assessment report that covers a 10-year period is a significant undertaking, particularly when interim Departmental reports have not been produced. Although some of the information required was available in documents produced during the period for different purposes (for example, research grant applications), much had to be collected *ab initio* from Departmental records, institutional data management systems, and "Departmental memory". The report itself indicates that some difficulties were encountered in obtaining complete information.

The Self-assessment report does contain a large amount of detailed information about the Department's activities and the views of its current undergraduate and postgraduate students. However, this is not always presented as clearly and directly as possible, and the report is rather longer than is perhaps necessary. Also, other than occasionally, the report does not place the activities, achievements and plans of the Department directly in the context of the Maynooth University Strategic Plan 2018-22. The report contains some analysis and reflection, and it is clear that the Department already recognises many of the issues identified by the PRG for improvement. However, greater use of summarisation and analysis of data would be more readily informative than the descriptive approach often used. Also, in the main, the report does not offer comparative assessment with national or international benchmarks, nor an assessment of alignment with the expectations of professional bodies or with common continuous quality control mechanisms used elsewhere in the Higher Education sector.

Whilst the contents of the report seem to be accurate, there are a small number of inconsistencies (in interpretation rather than data) and sometimes important details are missing. For example, from the information provided, in the reporting of research grants it is difficult to be certain about the amounts of funding that are associated specifically with the Department.

6. Findings of the Peer Review Group: Commendations and Recommendations

6.1 Overview

The findings of the PRG are based on analysis of the Departmental Self-assessment Report and the site visit. These findings are set out in the itemised commentary below and then developed into a set of commendations and recommendations, highlighting both the Department's strengths and areas where action plans need to be developed and implemented to effect improvement.

6.1.1 *Department Governance and Organisation*

Responsibility for organisation, direction and management of all aspects of the Department currently lies largely with the Head of Department, alleviated to some extent by the recent creation of the post of Deputy Head of Department. Operationally, several members of academic staff are Departmental Coordinators for specific undergraduate and postgraduate degree programmes, undergraduate year cohorts, postgraduate research students, final year projects, and work placements.

Currently, individual staff contributions to the Department are determined according to a broad plan to allocate teaching and administrative duties across the academic staff. The development and implementation of a full workload model that takes into account all types of activities and contributions would create a transparent mechanism and give staff some agency in directing their contribution to the Department.

Overall management of the Department seems to be essentially reactive rather than proactive, with insufficient emphasis on strategic planning. The Department does not have clear structures or systems for regular communication. Existing mechanisms such as Departmental meetings do not provide sufficiently frequent or appropriate opportunities to focus on improvements in operational management, performance assessment, or strategic planning. All of these aspects would be improved by the development of a formal Departmental Executive, enabling staff to meet regularly and plan strategically. Departmental reorganisation based on **subject groups** would help to foster a greater sense of community within the Department and facilitate staff to develop a sense of agency in shaping the future of the Department. Such a reorganisation would enable staff to input in structured ways into the revision of existing programmes and the development of new programmes; the development of research capacity and an enlivening of the research environment and culture;

mentoring of colleagues; and the enhancement of facilities and infrastructure in the Department. There are also opportunities for greater cooperation with administrative staff in a range of activities and planning in the Department.

6.1.2 Teaching, Learning, Assessment and Student Feedback

Since 2009 the Department has introduced new dedicated undergraduate programmes, a new Masters programme in Computer Science, and successfully maintained its commitment to postgraduate conversion by replacing its provision to address changes in the educational funding landscape. The Department has also developed its international profile through successful collaboration in the Erasmus Mundus Joint MSc programme. Over this period the Department has operated in an environment of significant expansion in student numbers. The situation has been complicated by fluctuations from year to year in the rising trend of student intakes, increasing student diversity, and a gradual reduction in the CAO entry points on all of the main programmes involving Computer Science. This has been a challenging environment in which to provide support for students and to maintain quality, but there is now greater stability in student numbers over the last three years.

It must be recognised that enhancing quality with increasing numbers of students of increasingly mixed ability is a challenge. The student survey reported in the Self-assessment Report showed that students appreciate the knowledge and dedication of many of the academic staff in providing well-structured and professionally delivered modules. In general, the students also recognise the excellence of the technical staff and their work in providing and maintaining up-to-date laboratory software and services. However, feedback from the PRG meeting with undergraduate students raised a number of areas of concern requiring action through enhanced quality assurance procedures. These include some specific concerns about aspects of the delivery of some of the modules by some members of staff. A lack of consistency in teaching, assessment and feedback was identified, with particular inconsistencies in the continuous assessment of the modules in terms of level of difficulty and amount, and uncertainty about scheduling and the marking schemes in some cases. In some modules feedback on assignments seems to be minimal. Whilst module details are available to students online in the Departmental Moodle and through CourseFinder, in some cases these show inaccurate information about module assessment, such as exam and continuous assessment weighting. Whilst students commented favourably on informal contact with the Head of Department, currently the Department has no formal mechanisms, such as staff-student liaison committees, that would enable students to bring forward concerns and the Department to commit to respond to them.

Even with higher numbers of graduates, the very good employability record of the Department's graduates has been sustained, and the Department has continued its commitment to employability through the work placement programme. Despite this, some current students have concerns about whether they are being equipped adequately to compete for highly competitive employment opportunities in the major technology companies at the leading edge of software development and IT. Although the Department hosts some industry visits and guest lectures, industry leaders (amongst which some Departmental alumni are prominent) could be engaged to a much greater extent, and in a

structured role, to help maintain the industrial relevance of its programmes. The recently established Computer Science advisory group, which includes alumni with recognised achievements in the IT and software industries, could be incorporated formally into the Department's curriculum development processes to ensure input from the software industry into future programme development and enhancement.

6.1.3 Research Activities and Outputs

In the formative years of the University's research institutes, the Department was strongly associated with their development, most particularly the Hamilton Institute and the former An Foras Feasa. Whilst three members of the Department are currently members of research institutes in the University, and many others are either affiliates of, or associated with, a research institute, strong connections between the Department and the institutes are limited to a small number of staff. This is resulting in correspondingly limited benefit to the Department in terms of support provided by the institutes' research environments, facilities, infrastructure, and the opportunities for development of research capacity. Additionally, with some members of academic staff being appointed principally to a research institute and then joining a department within the University, there is a lack of clarity about their role in that department.

Whilst research funding to the Department has been boosted occasionally by successes from major initiatives, since 2009 overall income to the Department from research grants has been modest by internationally comparable standards, being limited to a small proportion of staff. The Department is heavily dependent on SFI and vulnerable to changes in national research funding policies. Without sustained research funding across the Department, the number of postdoctoral researchers in the Department has declined, and it is difficult to sustain, let alone expand, the number of PhD students necessary for a vigorous research environment. Correspondingly, the number of conference publications has declined significantly since 2009, whilst the Department's annual output of journal articles has remained approximately constant.

Within the Department there are distinct areas of research excellence. However, wide diversity in research interests across the Department mean that, with some exceptions, research efforts are mainly individualistic and predominantly opportunistic. This makes it difficult to create a strong and supportive research environment and culture within the Department. New Departmental structures that identify and foster subject clusters, along with an action plan, are needed to develop research capacity in ways that can create sufficient critical mass for more successful funding applications. Such clusters could create the framework for the Department's "research identity" and for stronger interaction with both the University's research institutes and external partners, as well as for operational research management, including mentoring and collaboration.

6.1.4 Staffing and Staff Development

Whilst the Department currently has a total of 30 academic staff, 4 are currently on leave, and a further 4 senior staff are either seconded full-time to research institutes/centres or engaged

primarily in an institutional role. So the main teaching and administrative workload within the Department is carried currently by approximately 22 academic staff, supported by 4 technical staff and 3 administrative staff. There seem to have been some issues created at times by gaps in the administrative posts, and the current secondment of the Departmental Administrator will require planned action to maintain an appropriate level of support.

For several years since 2009 restrictions within the Higher Education sector have meant that the Department has had to cope without recruitment of new academic staff. However, with recruitment recommencing in 2017, the Department has appointed a new professor seconded to the Hamilton Institute and made 6 new Lecturer appointments, bringing the student-staff ratio into line with institutional norms. Some of the recent appointments are to fixed-term positions, and for sustainability the Department will need to establish permanent posts in the longer term.

Whilst recent recruitment has enhanced the Department with enthusiastic, energetic and highly capable new staff, there has not been a strategic approach to appointing new staff to build the Department's capacity in focussed research areas. In future recruitment, the Department should also be appreciative of diversity, particularly in relation to moving towards a gender balance. Once appointed, new staff are not currently supported through a Departmental or institutional induction process, nor through structured allocation of teaching and administrative duties to facilitate development of their early research careers.

Ongoing staff development is also an area where an action plan is needed – this should identify and address the development needs of administrative and technical staff, as well as the Department's academic staff. Associated with this, there seems to be a lack of clarity in the promotional procedures for academic staff, and an absence of structured advancement and promotion opportunities for both administrative and technical staff.

6.1.5 Resourcing and Facilities

The Department's new location within the Eolas building provides an open and welcoming environment, with good laboratory facilities for both undergraduate and postgraduate students, well-appointed staff offices, and proximity to three research institutes and Maynooth Works to facilitate engagement and collaboration. Computer laboratories are currently well equipped, and software and services well maintained; to maintain and enhance these facilities, the Department needs to ensure a funding plan to implement an ongoing programme of equipment renewal. Although the Department has some social spaces designed for small groups, some difficulties are arising from the current lack of meeting room facilities.

The Department will be engaged with the University's recently established joint college with Fuzhou University in China, with a member of staff appointed to develop the liaison. Currently it is unclear exactly how the Department will contribute fully to the new joint college and how the collaboration can be directed to enhance the strategic development of the Department.

6.1.6 Internal and External Engagement

It is clear that the Department plays an important role within the University and that this is strongly recognised by a range of other departments with which the Department interacts. The Department is regarded as cooperative, with positive relationships with other departments, though the Department's internal profile would benefit from greater representation on the University's internal committees, where possible.

Many of the Department's engagements with internal departments are conducted by the Head of Department. In addition to all of the other responsibilities of the post, this is a substantial undertaking for one person to manage, and greater delegation could be achieved through development and implementation of an action plan for Departmental reorganisation. Strong engagement between the Department and the University's research institutes/centres is limited currently to a small number of staff. Expansion in this regard should be a priority in the action plan to expand the Department's research capacity.

Similarly, expansion of the Department's external interactions should be a priority both in developing collaborations and partnerships to deliver research impact, and in maintaining the industrial relevance of its teaching programmes. Since 2009 the Department has developed extensive relationships with schools and led a range of outreach activities to promote participation in Computer Science, such as CoderDojo, Summer Camps, and the Bebras Computational Thinking Challenge. The Department has also been active in establishing and supporting opportunities for its students to participate annually in external competitions such as the Microsoft Imagine Cup, Robocup, IEEEExtreme, and the Irish Collegiate Programming Competition.

6.1.7 Implementation of Recommendations for Improvement Made in the Peer Review Group Report Arising from the Last Quality Review

In general, recommendations for improvement made in the 2009 PRG report in relation to aspects of teaching and learning have been implemented; in some cases the concerns that the recommendations were intended to address have been alleviated by developments rather than direct intervention. The 2009 PRG Report recommended development of an explicit target for the student-staff ratio. Since 2009 the environment has been one of significant expansion in student numbers alongside a prolonged period of restraint in the appointment of new staff. Correspondingly, the low student-staff ratio in 2009 was gradually reversed to one exceeding institutional norms, but with recent staff recruitment has stabilised and the Department's student-staff ratio is now in line with the Faculty average.

The Department has responded well to the recommendation to take greater responsibility for marketing of its courses and to develop stronger relationships with schools. Since 2009 the Department has developed extensive relationships with schools, promoted participation in Computer Science through a range of outreach activities, and strongly supported its students to participate successfully in prestigious annual external competitions. The recommendation to explore opportunities for wider markets internationally has been addressed by both the Department and the University through the Erasmus Mundus Joint MSc programme and the new joint college with Fuzhou University in China, respectively. The Department has also responded successfully to the recommendation to explore opportunities for internal

collaboration, introducing new BSc programmes in Robotics and Intelligent Devices in 2016 and Mathematics and Computer Science (with Education) in 2019. The Department has successfully addressed the recommendation to examine retraining opportunities, maintaining its commitment to conversion opportunities for non-Computer Science graduates by introducing the Higher Diploma in Science (Software Development) in 2015 and securing funding annually from the HEA Springboard programme for its continuation.

Recommendations made in the 2009 PRG report in relation to improvements in the provision and management of laboratory facilities and the teaching environment have been addressed by the Department's new location, since July 2015, within the Eolas building; good laboratory facilities are provided for both undergraduate and postgraduate students, there are well-appointed staff offices, and social spaces are available.

Many of the concerns raised in the 2009 PRG Report in relation to management and organisation of the Department still remain. Operational management and administration of the Department continue to depend heavily on a few specific personnel. In the main, recommendations to review Departmental strategies and action plans regularly, with a thorough annual internal review, have not been implemented successfully. Also, recommendations that both the Department and the University introduce developmental policies for newly appointed staff seem not to have been implemented. New staff are not currently supported through an induction process, and policies and structures for mentoring and managed early research careers seem to be absent.

The 2009 PRG identified that the research strategy seemed to depend on individual responses to opportunities and recommended a more explicitly managed approach to achieve greater collective effort and to better promote the Department's research capabilities. This situation remains largely unchanged, with new Departmental structures and an action plan needed to develop research capacity and create critical mass in focussed areas of research, promote a "research identity" for the Department, and generate stronger interactions with both the University's research institutes and external partners.

In relation to the 2009 PRG Report recommendations on the peer review process itself, as far as reasonably possible these have been taken into account by the University's Office for Strategy & Quality: the review covered all aspects of the Department's activities, external reviewers had an opportunity to comment in advance on the proposed site visit schedule, and the PRG nominated its Chair.

6.2 Commendations

The Department's contributions to the University are well-recognised by a range of other departments with which it interacts, and in general the students appreciate the professionalism, dedication and helpfulness of many of the Department's academic staff.

The Department is commended for its

- Provision of well-designed space for students and staff, with well-equipped laboratory facilities for both undergraduate and postgraduate students;
- Provision of excellent technical support that is appreciated by the students, with well-maintained software and services;
- Cooperative approach to working with other departments in the University;
- Introduction of new dedicated undergraduate programmes designed to attract students with different interests in Computer Science, spanning theory, applications and education;
- Development of a new Masters programme in Computer Science in recognition of the changing needs of typical student cohorts;
- Commitment to providing postgraduate conversion programmes that enable non-Computer Science graduates to enter the software development industry;
- Initiative in developing successful international student recruitment through the Erasmus Mundus Joint MSc programme;
- Development of extensive relationships with schools and leadership of a range of outreach activities such as CoderDojo, Summer Camps, and the Bebras Computational Thinking Challenge;
- Introduction of the Peer Support Centre to address the needs of students with increasingly diverse backgrounds, providing differentiated support matched to the full spectrum of abilities;
- Sustained support for students to participate annually in external competitions, with successes in competitions such as the Microsoft Imagine Cup and Robocup;
- Continued commitment to graduate employability through the work placement programme;
- Sustained good record of graduate employability in an environment of significant increase in student numbers.

6.3 Recommendations for Improvement

The recommendations below are designed to assist the Department in its production of an improvement plan. These vary in scope and scale, and range from recommendations on strategy and planning to organisational and operational issues. Some of the recommendations are directed to the University, but most are to the Department; some will require a joint process of exploration and discussion between the Department and the University. The PRG hopes that what develops from this review will not be just a response to its recommendations *per se*, but new or revised policies, structures, procedures and processes that enable the Department to develop and deliver a positive and fulfilling future for both students and staff, and to contribute as fully as possible to the strategic development of the University.

Institutional/Strategic Recommendations

Number	Recommendation	Additional PRG Comments
S.1	Introduce an annual internal review process for operational management, programme management, research performance, Departmental infrastructure and facilities, and strategic planning.	This should be a “light-touch” process designed to help Departments to carry out effective quality assessment and improvement.
S.2	Facilitate Departments to produce an annual Departmental report, providing information on student applications, enrolments, performance, work placements; postgraduate students and supervision; research applications and grants awarded.	In collaboration with Departments (U.7).
S.3	Promote student participation in the annual survey of student satisfaction.	In collaboration with Departments (U.8). This would inform ongoing quality assessment and improvement.
S.4	Introduce a framework for annual staff development and appraisal for academic, technical and administrative staff.	To be adopted by Departments (U.9).
S.5	Clarify the promotional procedures for academic staff, and establish structured advancement and promotion opportunities for both administrative and technical staff.	
S.6	Introduce a process that enables Departments to have input into setting student recruitment targets and CAO entry points annually, within the University’s institutional strategic plan.	This would enhance a Department’s sense of agency within the University and assist in planning its contribution to the institutional strategic plan.
S.7	For members of academic staff appointed principally to a research institute, clarify their expected role within the Department that they join, and the associated institute-Department funding model.	Greater clarity would help Departments in developing their research plans.
S.8	Develop induction programmes for newly appointed staff, and introduce developmental policies and structures to help Departments to manage early research careers successfully.	This would create a framework within which Departments could implement managed workloads, mentoring, and early career development (U.21)

S.9	Explore how the University's recently established joint college with Fuzhou University can enhance the strategic development of the Department, and <i>vice versa</i> .	This can help to direct the Department's strategic plans (U.25).
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Recommendations to the Department

Number	Recommendation	Additional PRG Comments
U.1	Develop a formal Departmental Executive, enabling staff to meet regularly, plan strategically, and take a more proactive approach overall to management.	The range of responsibilities that lies currently with the Head of Department is too great. The Department should maintain a plan with clear connection to the institutional strategic plan.
U.2	Review and revise the Department's structures and systems for regular internal communication.	Current structures and systems are not effective.
U.3	Implement a Departmental reorganisation based on subject groups that enables greater delegation of internal engagement with other departments.	This should create a structure within which staff can develop a sense of agency in shaping the future of the Department, and alleviate some aspects of the Head of Department's workload.
U.4	Review and formalise the terms of appointment of the various Departmental Coordinators (ie, for specific undergraduate and postgraduate degree programmes, undergraduate year cohorts, research students, final year projects, work placements).	Appointments should be for fixed terms, with the possibility of extension. Expressions of interest should be sought when appointments/re-appointments are made.
U.5	Develop and implement a full workload model that takes into account all types of activities and contributions.	Current workload allocation takes into account only some types of activities.
U.6	Create a Departmental calendar with dates published well in advance for Departmental meetings.	Regularity of Departmental meetings needs to be maintained.
U.7	Generate an annual Departmental report, containing information on all taught programmes; postgraduate students and supervision; research funding, outputs, collaborations and impact; staff contributions to the University; and a summary of significant external activities.	This should be facilitated by the University (S.2)

U.8	Conduct an annual survey of student satisfaction.	In collaboration with the University (S.3). This would inform ongoing quality assessment and improvement.
U.9	Introduce a process for annual staff development and appraisal for academic, technical and administrative staff.	Within a framework approved by the University (S.4).
U.10	Review the opportunities for administrative and technical staff to have greater input into Departmental activities and planning.	Opportunities exists for greater cooperation with administrative staff.
U.11	Introduce staff-student liaison committees for each programme, with a schedule of regular meetings.	Currently there is no formal mechanism for students to advance concerns and that commits the Department to respond to them.
U.12	Conduct a review of continuous assessment across modules on each programme, with a view to consistency, clarity of marking schemes, scheduling, and feedback; and establish guidelines for staff and students.	Students have commented on variations and uncertainties in some aspects of continuous assessment, and in some cases on the quality of the feedback received.
U.13	Introduce a mechanism to ensure regular review of module information available to students online in the Departmental Moodle and Course Finder, and consistency with information available elsewhere.	Students have commented on some inconsistencies and uncertainties.
U.14	Introduce mechanisms through which industry leaders could have a structured role in informing curriculum development and maintaining the industrial relevance of the Department's programmes.	The recently established Computer Science advisory group could be incorporated formally into the Department's curriculum development processes.
U.15	Identify subject clusters for research within the Department, and develop an action plan to use these as a framework to increase research capacity.	In the absence of focussed critical mass, current research efforts are mainly individualistic and predominantly opportunistic.
U.16	Adopt a more explicitly managed approach by appointing a Research Director or "Research Champion" to provide leadership and create a supportive research environment and culture within the Department, to include a seminar series.	This role would develop and promote the Department's "research identity", lead operational research management, and encourage mentoring and collaboration.
U.17	Conduct a review of the Department's current links with the University's research institutes and centres, and develop an action plan for more extensive and stronger interactions that would help to develop the Department's research capacity and enhance its profile.	Currently, strong connections between the Department and the institutes are limited to a small number of staff. The Department is a natural partner for many of the research priorities of the Hamilton Institute.

U.18	Based on subject clusters identified, conduct a review of research capacity in relation to strategic priorities of the major funding bodies; and develop an action plan for funding applications that are collaborative and have critical mass, in collaboration with the Research Development Office.	Without sufficient research funding, it is difficult to maintain esteem, or expand current areas of research excellence with teams of postdoctoral researchers and PhD students.
U.19	Develop a staffing plan, and adopt a strategic approach to the appointment of new staff in order to build the Department's capacity in focussed research areas.	This approach should align with the subject clusters identified (U.15).
U.20	Be appreciative of diversity, particularly in relation to moving towards a gender balance.	The Department could work towards a Bronze award under the Athena SWAN Charter.
U.21	Introduce induction programmes, developmental policies, and managed early research careers for newly appointed staff.	In conjunction with policies and frameworks developed by the University (S.8). New staff are not supported currently through an induction process, and policies and structures are not in place for early career support and development.
U.22	Develop and implement an action plan to maintain adequate administrative support during periods of staff secondment.	This will be important during the secondment of the Departmental Administrator.
U.23	Develop a plan for regular periodic renewal and enhancement of laboratory equipment and infrastructure	This should identify potential funding initiatives to meet constantly changing needs and expectations.
U.24	Identify meeting room space to facilitate frequent staff meetings.	This would enable staff meetings for which current social spaces are not always appropriate.
U.25	Determine how the Department will contribute fully to the University's recently established joint college with Fuzhou University in China.	Discussion with the University is required to explore how the collaboration can be directed to enhance the strategic development of the Department (S.9)
U.26	Explore opportunities for greater representation on the University's internal committees.	This is a natural way both to build individual staff careers and increase collective influence in institutional decision-making.

COMPUTER SCIENCE DEPARTMENT: PEER REVIEW GROUP SITE VISIT TIMETABLE

Tuesday, 30th April, 2019		
Time	Description	Venue
19:00	<p>Convening of the Peer Review Group.</p> <p>Briefing by: Professor Aidan Mulkeen, Vice President Academic and Registrar</p> <p>PRG agrees a Chair and discuss the visit.</p> <p>Identification of any aspects requiring clarification or additional information.</p> <p>Dinner for members of the Peer Review Group, Professor Aidan Mulkeen, VP Academic, Registrar and Deputy President and Ronan Farrell, Faculty Dean</p>	<p>Booked Carton at 7.00pm for 6 people under the name Mulkeen</p> <p>Aidan Mulkeen Ronan Farrell Carol O'Sullivan Bryan Scotney Tom O'Connor Mary Gilmartin</p>
Wednesday, 1st May, 2019		
Time	Description	Venue
8:30-9.00	Convening of Peer Review Group	JHB
9.00-9.30	<p>Dr Joe Timoney, Head of Department</p> <p>Mr Tom Lysaght, Deputy Head of Department</p>	JHB
9.30-10:30	Meet All Departmental Staff (Head & Deputy Head of Department recused)	JHB
10.30-12.00	Tour of Department with refreshments escorted by HOD	Department
12.00-12.30	<p>Meeting with Staff Group 1</p> <p>Mr Tom Lysaght, Deputy Head of Department Dr Aidan Mooney, Lecturer Professor Tom Naughton Professor Vicenc Torra Dr Philippe Moser, Lecturer Dr Kevin Casey, Lecturer Professor Damien Woods</p>	Council Room

12.30-13.00	Meeting with Staff Group 2 Dr Joseph Timoney, Head of Department Dr John Keating, Senior Lecturer Dr Brian Davis, Lecturer Dr Phil Maguire, Lecturer Dr Hao Wu, Lecturer Mr Dermot Kelly, Lecturer Dr Brian Hennelly, Lecturer Mr Emlyn Hegarty-Kelly, Tutor	Council Room
13.00-14.00	Working Lunch	Reserve Pugin Hall/Table with service for Quality/4 people
14.00-14.45	Meet with Undergrad Students (10)	Council Room
14.45-15.30	Meet with Postgrad Students (11)	
15:30-16.00	Meeting with Staff Group 3 Admin Staff Ms. Phil Dully, Executive Assistant Ms. Heather Meldrum, Executive Assistant Mr. Des Noonan, Departmental Administrator	Council Room
16.00-16.30	Break	Council Room
16.30-17.00	Meet with User Group/UE Member/HOD/Other 1 Ms Sheila Purcell, Deputy Admissions Officer Professor Chris Brunsdon, NCG	
17.00-18.00	Phone Calls to External Stakeholders (3 x 10 mins or 2 x15mins) 17.00 Aindriú O' Meara, Initse 17.10 Treasa Keegan 17.20 Barbara Hegarty, Coderdojo	
17.30-18.00	PRG Group meeting	Council Room
19.00	PRG private working dinner	Booked Carton House Hotel at 7pm for 4 people under the name O'Connor

Thursday, 2 nd , 2019		
Time	Description	Venue
9.00-9.30	Convening of Peer Review Group	Council Room
9.30-10.00	Meeting with Professor Ronan Farrell, Faculty Dean	Council Room
10.00-10.30	Meeting with Staff Group 4 Technical Staff Mr James Cotter, Chief Technical officer Dr Vanush Paturyan, Senior Technical officer	Council Room
10.30-11.00	Meeting with Staff Group 5 Dr John McDonald, Senior Lecturer Dr Charles Markham, Senior Lecturer Dr Tim McCarthy, Senior Lecturer Dr Liadh Kelly, Lecturer Professor Barak Pearlmutter Dr Peter Mooney, Lecturer	Council Room
11.00-11.30	Break	Council Room
11.30-12.00	Meet with User Group Professor Stephen Buckley, Head of Mathematics & Statistics Ms Paula Murray, Head of Placement Office Ms Helen Kirrane, International Office	Council Room
12.00-12.30	Meeting with Staff Group 6 Dr Stephen Brown, Senior Lecturer Dr Edgar Galvan, Lecturer Dr Ralf Bierig, Lecturer Dr Diarmuid O' Donoghue, Lecturer Dr Tom Dowling, Lecturer Mr Joseph Duffin, Assistant Lecturer	Council Room
13.00-14.00	Lunch	Reserve Pugin Hall/Table with service for Quality, 4 people

14:00-16:30	Preparation of Exit Presentation	Council Room
16:30-17:00	Exit presentation to all departmental staff, made by the Chair of the PRG, summarising the principal commendations and recommendations of the Peer Review Group.	Renehan Hall
17:00	Refreshments and Exit of the PRG	Renehan Hall