Maynooth University
National University of Ireland Maynooth

Ollscoil Mhá Nuad

Maynooth University

QUALITY IMPROVEMENT AND ASSURANCE

PEER REVIEW GROUP REPORT

DEPARTMENT OF CHEMISTRY

ACADEMIC YEAR 2018-2019

Date – 25th April 2019

Contents

1. Introduction

The Maynooth University Department of Chemistry was formally established in 1997 in the context of the creation of the National University of Ireland Maynooth. However its origins can be traced to 1957 when chemistry was first firmly introduced within the Faculty of Science in the then University of Ireland St Patricks College Maynooth (established in 1795).

The Chemistry Department is now within the Faculty of Science and Engineering under the stewardship of the non-executive Dean of the Faculty Prof Ronan Farrell. It is one of eight departments in that faculty alongside Departments of Biology, Psychology, Mathematics and Statistics, Computer Science, Experimental Physics, Theoretical Physics, and Electronic Engineering. The department presently has 12.5 FTE academic staff, 8.8 FTE technical staff alongside 2 FTE administrative staff, it hosts a post graduate community of 6 post doctoral researchers, 14 PhD students and 8 MSc(Res) students. Together the department services 267 undergraduate FTE students across four undergraduate degrees, BSc. Pharmaceutical and Biomedical Chemistry (MH 2010), BSc. Science Single Honours Chemistry (MH201), BSc. Science Double Honours Chemistry (MH201, and BSc Chemistry with Pharmaceutical Chemistry (with CCZU in China). It also contributes to specific years in four other undergraduate degrees within the faculty (Biotechnology, Science Education, Biological and Biomedical Science, Physics and Astrophysics).

This review took place over April 2-4 2019 following a significant level of consultation and self-reflection and the production of a Self-Assessment Report which was distributed to the review panel in February 2019. It is clear that the Department of Chemistry is a significant asset to the University and is central to the development of all science-related research and teaching in Maynooth University. It is also the case that Maynooth University is committed to developing the department in terms of staffing, space and resources. However, it is equally clear that the present size of the department is insufficient to maintain its central function across the sciences and that it needs to be at least double in size to meet the level of present demand and aspirations for its future role in the overall strategy for Maynooth University. We note a useful international benchmark for sustainability is 25 academic staff. An alternative comparative benchmark is total departmental staff (inclusive of academic, technical and administrative). Maynooth Chemistry at 23.5 compares poorly to other Irish universities, with DCU and UL at 33 and UCC and TCD at 45.

The 2009 review which described the Chemistry Department as a 'jewel in the crown' of the University (at least in the sciences), described the historical development of the university which grew from 1 staff member in 1957 to 3 members (2 academic, 1 technical) in 1977. By the 1990s, the Maynooth Department of Chemistry had grown to 8 academic and 3 technical staff supporting a BSc general degree and 2 BSc honours degrees. However, this growth proved unsustainable and undergraduate student numbers fell through the 1990s, and by the early 2000s postgraduate numbers were also falling. While in this context internationally some chemistry departments were closed, the trajectory of Maynooth Chemistry was different. Under the leadership of Prof Lowry (appointed in 2006), Maynooth Chemistry doubled postgraduate numbers, increased undergraduate numbers by some 40%, dramatically increased research funding, and attracted early career academics of international

standing (on short-term contracts). This growth, while laudable, meant that by 2009, at the time of the previous review, the Department was vibrant but 'creaking at the seams in terms of space and staff work-loads'.

The timing of the recommendations of the previous review could not have been more unfortunate. 2009 was the first year of what was to become a period of economic recession and austerity-driven policies during which government funding for undergraduate education dropped from €8,734 pa to €7,130 pa. Staff salaries were also reduced, a staff embargo was followed by a restrictive employment control framework and science funding was cut back and re-directed towards large, applied initiatives. The university coped with an overall 12% reduction by increasing student numbers (from 7,356 in 09/10 to 10,172 in 17/18). At the same time, national disinvestment in postgraduate education has seen postgraduate research posts across the university drop from 513 in 2008/9 to 428 in 2017/18. The Department of Chemistry has not had a taught masters programme, so were not impacted by the increase in taught masters from 1,300 to 1,594 over 09/10 and 17/18. Table 1 in Appendix A summarises the 10-year period from these perspectives. We commend the department for its commitment and resilience over this difficult period and note that it continued to innovate and expand outreach and engagement.

While the economy has been in recovery since 2015, the Chemistry Department is still coping with this decade of underinvestment and it was only in 2018/19 that Science Foundation Ireland relaunched a funding profile which is relevant to the majority of academic staff. We find it is struggling to service a significant growth in undergraduate numbers (a consequence of Maynooth University's short-term recession strategy and longer-term growth strategy) in the context of underinvestment in staff across all levels and the drop in postgraduate students (Appendix A, Table 1).

The growth in undergraduate numbers has to be seen in the context of the 2009 review assessment that the department with 156 undergraduate students was 'creaking at the seams in terms of space and staff work-loads'. This review concludes that, with 267 undergraduate students, similar staff FTEs and only two thirds of the post-graduate FTE, the department is no longer able to provide the required level of teaching and servicing without compromising health and safety, staff well-being and both established and early research careers. While all the staff and students stress the quality of their collegial working relationships, their quality of working environment will have serious implications for capacity to attract and retain both staff and postgraduate researchers. While we understand the university is actively pursuing space for new buildings and is planning a refurbishment strategy, we note that promises over the past years did not materialise. It is imperative, if the university and staff aspirations for the Department of Chemistry are to be realised, that the space and staff limitations are meaningfully addressed before the next quality review expected in 2022.

2. Peer Review Group Members

Name	Affiliation	Role
Alison Hulme	University of Edinburgh	External Assessor
Pietro Cicuta	University of Cambridge	External Assessor
Mary Murphy	Maynooth University	Internal Assessor
David Stifter	Maynooth University	Internal Assessor

3. Timetable of the site visit

Meetings were held over a two day period, the intense schedule gave enough time for us to form, and discuss, opinions about the Department of Chemistry and enough flexibility for us to then discuss questions which arose with the HoD at a second, more impromptu, meeting. The process was suitable and adequate in scale and scope to meet the review objectives.

Timetable: see Appendix B.

4. Peer Review Methodology

4.1 Site Visit

We met with senior management from Maynooth University, including the VP Academic and Registrar, the VP for Research, the Dean of Graduate Studies, Director of HR and the VP Estates and Capital Development. We met with the HoD Chemistry and 4 groupings of members of the department (technical staff, undergraduate and postgraduate students, administrative and academic staff). We also consulted with two external stakeholders by teleconference. We toured the spaces of the Chemistry Department, within the main Science Building, looking carefully at all teaching labs and most research labs.

We had two evening meetings, the first introductory to decide our own internal management and chairing process, the second after a full day of review meetings to reflect on key observations. A third three hour meeting on the final day allowed us to reflect on key commendations and recommendations and confirm our process for concluding the drafting of the final report.

4.2 Preparation of the Peer Review Group Report

The report was first drafted with all four panel members present, on the afternoon of the second day of the visit, in order to clarify the main points for our SCOT analysis and exit feedback. The report was then edited by sharing the file, and all members worked on the document. The final version is agreed by the whole panel.

5. Overall Assessment

5.1 Summary Assessment of the Department

Overall we agree with many (but not all) of the points in the SCOT self-assessment. Our own summary is presented as a SCOT analysis, as follows.

Key Strengths:

- Resilient, committed, and motivated staff.
- Strong sense of collegiality with highly dedicated technical staff.
- All staff actively engaged with research, which aligns with MU Strategic Plan.
- Outstanding support provided by staff to the student cohort.
- Sustained positive and competent leadership at HoD level.
- Expanding catchment area, attractive to business, students, and for national and international collaboration, e.g. international transport links.
- Excellent gender-balance at all levels of staffing.

Key Challenges:

- Lack of space for both teaching and research activities, and for social interactions.
- Number of teaching staff is half the number that we believe to be a sustainable chemistry department.
- New staff have little chance to establish a research profile due to the high teaching loads and modest start-up investment.
- 60% of research income generation is sustained by just two members of staff.
- Issues relating to the number and quality of undergraduate students including retention rate of students throughout the undergraduate programme.
- Falling number of post-graduate students, leading to a fragmented cohort and a difficult context for conducting research and providing teaching supports.
- Challenge for MU to align the structured PhD programme with the needs of students in the Faculty of Science.
- More interpersonal links and collaborations with biologists needed.

Key opportunities:

- Chemistry, as a subject, is a central piece of many future developments in teaching and research within MU.
- A strong Human Health Institute will allow new research collaborations across traditional subject boundaries.
- New laboratories would allow an immediate release of space concerns, growth and provide an increased quality of teaching experience.
- New collaborations with industry should be possible due to strong regional investment.
- MU de-emphasis on undergraduate growth allows a review of student performance data to perhaps reassess the effect of lowering CAO points on entry.

- A taught Masters degree (with a well-thought-out business model) would provide an opportunity to generate income, enhance internationalisation, increase the visibility of the department, and to identify potential PhD students.
- Potential to exploit position as an English-speaking country within the EU to attract undergraduate and postgraduate students; on a national level, this might require a stronger convergence with Bologna degree structures.
- Potential to develop, implement, and exploit IT in the teaching process, for example in the hand-in of laboratory reports and return of feedback to students on these.

Key threats:

- Difficult funding situation nationally, and underfunding of the third level sector nationally.
- De-prioritisation of research by MU in recent years has rendered the department non-competitive for major funding.
- Demotivation of staff in the absence of a clear strategic direction for the university.
- If key technical staff retire without planned replacement, the department will not be able to cope.
- No clear succession planning for the next Head of Department.
- Potential for a serious safety incident in the laboratories due to over-crowding.

5.2 Self-Assessment Report

The PRG appreciated the clarity and structure of the Self-Assessment report provided by the Department. Virtually all relevant issues were addressed in the Report, which was complete and accurate. The methodology employed in the preparation of the Self-Assessment Report was clear, and evidences a significant level of staff and student consultation and engagement. We perceived a broad and significant degree of ownership of the report and its contents.

We note that some data was presented as a composite from 2009-19, whereas it might have been helpful to have the past 3 years captured separately. The Dept sets out an ambitious quality implementation plan (pp. 67-69), but not all of the strategic priorities outlined in conjunction with the current University Strategic Plan 2018-22 (p26)[1] are addressed, esp. "internationalisation" and "equality, diversity, inclusion and interculturalism".

However, no clear link was provided between institutional priorities and an overall departmental research strategy.

[1] The institutional priorities outlined in the University Strategic Plan 2018-22 (page 26), focus on:

- *Targeted investment in research capacity in a number of priority areas;*
- *Extending the postgraduate portfolio and growing the postgraduate community;*
- *Realising the full benefits of our innovative undergraduate curriculum;*
- *Enhancing the student experience;*
- *Comprehensive and ethical internationalisation;*
- *Equality, diversity, inclusion and interculturalism as enablers of academic excellence.*

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

6.1 Overview

We comment here on details from the Self-Assessment Report and as identified during the Peer Review Group Visit, following the headers suggested to us.

Department governance and organisation

The department governance structure (page 23) is clear. The Head of Department (HoD) is paid on a Senior Lecturer scale (page 6); this is simply not appropriate for what the University is requiring of this person. We welcome the fact that the HoD in Chemistry is supported with a fulltime researcher, an arrangement which we understand is unique in MU departments. While there is clearly communication with the more central university management, it was not obvious from the report how often the HoD meets with the Dean of Faculty, we would recommend at least a termly personal meeting, in addition to other wider university processes. We were not completely clear about the role of HoD more broadly in the governance structure of MU, but felt that the question was outside the scope of this review.

There is a comprehensive set of committees (page 24) organised by the HoD, covering the main activities of the department. We were not provided with the Terms of Reference of these committees. We understand that this falls outside current MU practice, but it is good practice elsewhere for committees to publicly state their remit, their composition (ex-officio, nominated, or elected members, with terms), and to publish their non-confidential minutes in an accessible place (e.g. intranet). We note (page 23) that the HoD sits on all committees but does not necessarily chair them all.

Together with the fact that the HoD coordinates teaching (page 33), the current load seems too heavy for one person. A common practice would be to deputise management roles for teaching, finance and resources which then report to the HoD. The department would benefit greatly from University proposals to introduce a more senior, or executive, Administrator on a permanent basis to oversee financial matters rather than this being the responsibility of the HoD.

Finally, we noted that the current Administration staff are not trained in ChemDraw. Providing them with training in it could contribute to streamlining the process for correcting examination papers.

Teaching, learning, assessment and student feedback

A core issue for teaching is the degree to which student numbers have increased without a parallel increase in teaching resources and space. Other comparable universities have significantly increased the minimum and median points thresholds for the omnibus science degree and reduced overall intake (Appendix A, Table 2). Maynooth University has instead experienced the opposite: decreasing the minimum and median points entry (while substantially increasing student numbers).

Aside from the obvious pressure on space and teaching resources there may also be other implications arising from a strategy to increase numbers without adopting a minimum entry point threshold. It is not clear from statistical evidence, or from the mixed experience and opinion of staff whether there is any correlation between entry points and subsequent progress. Nor is there evidence that it is the students with lower entry points who experience the need for additional support. Some staff (academic and administrative) point to recent specific experience of a cohort of struggling students which they speculate may be associated with rising numbers/declining points. There should be a sufficient statistical evidence base to examine correlation between point entry level and subsequent student learning experience and to revise policy accordingly to ensure all admitted students are adequately supported.

There is a current fail rate in 1st and 2nd year of 10-12% (page 38). Our impression from both students and staff is that this is inevitable, and that these students are not failing due to anything MU can reasonably do. This leaves open the question if there could be a way to advise these students against starting. In addition, there is a yet unknown impact of University-led change in assessment regulations on student quality in later years of the degree programme. There is the danger that the more generous University compensation mechanism will allow students who do not meet the subject-specific requirements to progress into higher years.

Critical to the long-term health of the department is an increased conversion of student numbers from the early years to the single and double honours programmes in chemistry. It is recognised in the report (page 44), and also our advice, that there is opportunity to increase final year student numbers with more diversity in the courses provided. But there is no resource provided to deliver this (although we acknowledge two new appointments are forthcoming).

Despite the difficulties due to space restrictions (see below in "facilities") and limited academic staff, the value of teaching provided is one of the areas of excellence that was most obvious throughout the visit, as supported by an enthusiastic set of student representatives. The department has an open-door policy for students (page 33), and it was confirmed during our visit that many staff follow this principle. We are not sure that this is sustainable with recent current increases in student numbers and a staff/student ratio of 23:1. A suggestion was made by staff, that perhaps a system of "clinics" could be beneficial and efficient following a model successful in Maths. If staff are to be encouraged to do more research, we would suggest switching to more restricted office hours, plus meetings by appointment. The HoD plans to create a "student forum" and to use Moodle to communicate about recurring questions and issues. This may help to channel some of the student-staff interaction.

We noted that students are currently learning practical chemistry in an environment which simply is not safe: large classes, combined with students sharing 6 to a fumehood to conduct experiments increase the risk of accidents. In a bid to reduce the risk, students are not being taught key undergraduate experiments and the HoD stated that accreditation of the degree programme could not be sought from the Royal Society of Chemistry because students simply did not acquire sufficient laboratory hours.

It has been confirmed by the lecturers that the attendance in laboratory classes is good. However, it is recognised in the report (page 46) and also remarked by various academics, that there is poor lecture attendance, even in 80+% range which is very high! We

determined that lectures are not video captured, whereas this could allow students with other commitment to watch them at times which suit better.

Finally, we identified, from staff and student feedback, that the content of some of the Critical Skills modules in 1st-year are not well suited for science students.

We identify as most significant the following student feedback documented within the self-assessment report (page 46-47) and which was affirmed at the time of the visit:

- For the Pharmaceutical and Biomedical degree, students find "the process of finding a placement overwhelming"; it is not clear whether this is related to low conversion numbers for this degree programme. We suggest greater clarity is needed in relation to help for students and who is in charge of placements. The placement office appears to be understaffed and more attuned to servicing other forms of placements.
- Despite glowing feedback, students would like more opportunities to be given feedback in tutorial-style classes and more opportunities to practice mechanisms. Curly arrows cannot be taught on-line!
- 4th-year students think that they get enough feedback on project work, 2nd-year students would like more feedback on laboratory work.
- There is not enough study space on campus.
- There is not enough social space for students. Social space would facilitate communication across the years which we note does not happen organically.
- There are not enough fumehoods to conduct project work.
- There are requests from students for information on final-year projects to be available sooner, for a theoretical chemistry final-year module and for more choice of modules.
- The MU Career Office appears to be not well equipped to cater for the special needs of science students.

Research activities and outputs

The Department's stated Objectives (page 8) are to:

- Offer high quality programmes at undergraduate and postgraduate level.
- Conduct world-class research, and to be recognised internationally for that research.
- Have a high level of engagement with the public, civic organisations and industry.

However, with the current staff-student ratios, achieving these goals is difficult. Notwithstanding, the data provided show that most staff have managed to stay research active, and talking to staff we got a very clear sense that they wish to take part in research. Staff believe that the right track for the department is to increase its quality by balancing teaching and research. During our visit we also appreciated the lack of national investment in recent years, and the signs of some new funding schemes to which many in the department have applied. So there are positive signs!

The data of the last few years is not so positive. The report (page 17) mentions a very small number of PI-led awards available from SFI, and the number of Fellowships supported by the IRC (formerly IRCSET and IRCHSS) has decreased. At this funding level, the ambition of a fully research-active complement of academics at MU is not achievable. At the time of the

2009 review (page 56) there was € 6.4M active research funding for that year. From 2009–2018, the amount of available funding has been approximately the same – but stretched out over 10 years.

We understand that in Ireland "targets" are not discussed with academics, nor is there a 'funding per head model'. Nonetheless it is necessary to find mechanisms to incentivise generating research income. A system whereby senior colleagues who are successful in attracting funding could mentor less successful colleagues might also help to increase the success rate. There has also been a lack of recent spin-off companies (following two, page 59, formed in 2009 and 2010) and a steady decrease of the number of invention disclosures (page 59).

There has been a dip in numbers of publications (page 53), due in part to the departure of senior academics and replacement with academics at an earlier stage in their careers. Lower PhD numbers can also be identified as a factor. In our opinion, the teaching burden of both staff and PhD students is also responsible for this trend (if the PhDs working in the department are overloaded with teaching duties then the number of publications will drop). At the same time, if the "base research" of staff is not competitive, the chances for acquiring prestigious European funding are greatly diminished.

We note (page 57) a reduction in studentships coming from MU, which we understand in part to be due to a re-structuring of the John & Pat Hume grants so they are more generous but fewer available. An increase in graduate students would be an obvious improvement to the sustainability and research profile of the department, and we recommend renewed efforts at industry and EU funding in this space. Specifically, the ETN and EJD ITN EU programs should be prioritised. We acknowledge new forms of PhD studentships in the context of the new university-level strategic target to increase PhDs across the university.

We note positively that two new academic staff are being recruited, but we are worried that their "start-up" is funded only by aligning an MSc (Res) position to each together with modest in-kind support for instrumentation and consumables; in international comparison, this is not enough support to gain significant traction. There is ample evidence that funds invested in start-up resources assigned to new appointees have the highest returns in research income.

Staffing and staff development

There are only 12.5 FTE staff members (page 6), supported by 14 PhDs and 6 PDRAs to assist in lab teaching and demonstrations. This is too heavy a burden, we could not find a comparable Chemistry department in the UK, and one of the external stakeholders stated that in the top 50 USA departments the smallest has around 25 academics. Perhaps as a consequence, there has been a high turnover since the 2009 review (page 8): 1 retirement, 5 staff members (4 of whom were in contract positions) have left and 7 new staff members have joined. Hence, since the 2009 review there has been only one additional FTE, despite the doubling in numbers which was recommended.

The MU Strategic Priorities (page 26) include "Extending the postgraduate portfolio and growing the postgraduate community", but in the Department's self-assessment we noted that (page 28) the numbers are actually +19% increase in PGT, but -19% in PGR. This is not in line with University Priorities. On examination of the student numbers for 2017-18

(page 12), we noted that there were (70-18) = 52 students in the final-year cohort conducting research projects. With 14 PhDs + 6 PDRAs, this means that each of these researchers was looking after 2-3 project students in the year. While a number of these projects were necessarily conducted as "literature projects" (perhaps taking up less of the PhD/PDRA time) for safety reasons, this ratio of student to PG/PDRA does not allow postgraduate researchers to develop or to have sufficient time to conduct their own research. Both the technical staff and the postgraduate students raised concerns that postgraduates were paid at different rates to hired external contractors for demonstrating. It is therefore important for the department to clarify the different roles which these two groups of demonstrators undertake.

The strategic plan for MU also states "the importance of improving workload management in order to support staff and departments in dividing their time and commitment appropriately between teaching, research and service." Our understanding is that the Chemistry department carefully balances lecturing loads, but a more complete "workload model" including lab time, teaching development, admin time, PhD and post-doc supervision, grant writing, etc. should be discussed and implemented. Furthermore, it is apparent that guidance from the MU Executive for a university-wide, fair workload allocation module is required.

As well as the 2009 report, External Examiners (page 48) all comment on the heavy workload for staff, and that the department is heavily reliant on their highly qualified and highly competent technicians. We saw clear evidence of the commitment and excellence of technicians, however we also observed how loss of key technical staff leads to gaps in core functions and instrument maintenance. We noted the need for investment in some key technical staff replacements in the next 5 years, especially to keep the NMR machine in operation, and to appoint in advance of retirement to allow for smooth transitions.

Both technical and administrative staff are universally praised; it was unclear whether the University has an effective process to reward their excellent service, for example in a clear career plan with regular promotion rounds. There is also a request by the technical staff for more opportunities to attend training courses (page 61) as part of their career development. We commend the training undertaken by the HoD on unconscious bias (page 62) and recommend that staff engaged in recruitment at all levels are offered similar training.

Resourcing and Facilities

The Department currently occupies labs and offices over 5 buildings (page 20) – this is simply too spread out to collaborate effectively. Students (page 12) comment on shortage of space in labs and we note the absence of space for writing up final-year projects.

We also note that External Examiners comment on the "onerous task of maintaining equipment which has far exceeded their normal lifespan" (page 49). Investment in kit by MU is desperately needed. We note one functional experiment is delivered using 5 different instruments of varying ages in the undergrad teaching labs requiring 5 different sets of instructions for their operation, a significant drain on resources. As noted earlier the size of the academic staff is the biggest problem; on page 22 it is stated "However, the chemistry department at DCU is double the size, which strongly suggests that MU is under-resourced in terms of academic staff relative to other Chemistry departments nationally." The argument

goes that MU teaches at least the same number of students as DCU, but there are twice as many staff at DCU as at MU.

Internal and external engagement

The department is engaged in a good level of outreach. We were particularly impressed by the programme described on page 18, of Leaving Certificate students attending January revision labs. This has increased from 530 students attending in 2009 to in excess of 1100 students attending in 2016-18. It is a technician-led initiative, and we understand this to be also revenue-generating. The Grab A Lab Initiative is also commendable.

Equality, diversity, inclusion

The technical staff note (page 61) that "work-life balance is supported by the structures in the department". We were positively impressed by the morale of staff employed under a variety of part-time and fixed-contract arrangements. There is a high proportion of female staff (page 62, 50% academic, higher elsewhere), with no evidence of a glass ceiling. We note and support the intention (page 63) to submit an Athena Swan departmental award in 2020.

Recommendations for improvement made in 2009 Peer Review Group Report

We believe it is instructive to revisit the main findings of the 2009 panel.

The 2009 panel made a number of positive observations about the department, including:
"It is clear that the Department of Chemistry is a jewel in the crown of the University, at least in the sciences". The panel noted strong leadership in the department. They highlighted:

- *The friendly and equitable atmosphere put forward by virtually all the faculty, staff, postdocs, and students.*
- *The success in improving student recruitment at all levels.*
- *The solid, well-funded programs of research including strong ties to industry.*
- *The attempts to connect with the strong biology Department at NUI Maynooth.*

In 2019 the leadership and the first two points are still very positive. The funding and research links have declined, and the connections to biology could be better.

The 2009 panel also identified weaknesses:

- *The small size of the department, which makes it less competitive for some research awards.*
- *Lack of a coherent strategy to create more space for science departments to grow (and a note that failure to address this could harm the atmosphere in the department).*
- *Many staff were obviously overworked and that care was required as these workloads were unsustainable and there was a risk of staff burnout.*

In 2019 most, if not all, of these are still valid.

The major issues for the department in 2009 were:

- *Lack of quantity and quality of space.*
- *A real need for growth of the academic staff and related staff.*
- *High teaching loads in the Department.*

- *Lack of a means to maintain continuity in the current excellent leadership.*
- *Lack of top-quality support instrumentation, most notably high-field NMR.*

In 2019 the only one of these issues that has been resolved is the purchase of a 500 MHz NMR instrument. The issues that remain unresolved are space and staff investment needed and high teaching loads.

The major recommendations of the 2009 expert panel were:

1. *Hire an Executive Officer to support the Department Head and develop a strategy for long-term stability in the Department leadership.*

We note this has not been done. We recommend that the HoD be supported by an Executive Officer, and/or delegate responsibility for maintaining the organisation of teaching. A system of deputy-HoD (a common arrangement is one for teaching, one for finance and resources) could free HoD time, and also increase the number of people able to rotate into HoD role.

2./3. Build a connecting building "bridging" between Chemistry and the Life Sciences to house core facilities and institute research groups. This should include student accommodation and some fluid research lab space. Make this connecting building a foyer for the university and access foyer for the Departments.

We note this has not been done. We remark that the ambition and plans should be developed for the long term: unifying Chemistry, Physics, Biology, Maths into one building would give huge benefits in visibility and capacity to sustain leading research.

4. Increase the size of the faculty to twice its current size to maintain some pace with biology, to double the number of graduate students, and to increase the number of undergraduate majors by 50%.

We note this has not been done. Staffing has increased by 10% (not 100%), while undergraduate numbers have further increased by ~70% .

5. The Department should work with the Department of Biology to obtain some new and much needed equipment (NMR, etc).

A new NMR instrument has been acquired, and care has been put in re-purposing second-hand instruments from industry and government labs. However, there remains a challenge of providing high-quality teaching and research kit.

Overall, we note the absence of progress in implementing the 2009 review recommendations and are concerned that MU university makes best use of opportunity to process our own 2019 Quality Review recommendations.

6.2 Commendations

A number of commendations were made:

- The HoDs have led the department through a challenging period of expansion in student numbers in the face of very severe cuts to funding streams, whilst maintaining themselves a strong research profile.
- High levels of student satisfaction, experienced by ourselves and evidenced in the external examiner report.
- Positive interaction and outreach through the Leaving Certificate students attending January revision labs (numbers have increased from 530 in 2009 to in excess of 1100 in 2016-18).
- Evidence of innovation and creativity, for example the “Grab-a-Lab” scheme.
- “Strong team spirit” in the technical staff on whom the department is very reliant.
- Excellent gender balance across staff at all levels and plans to submit for a Departmental Athena Swan award in 2020.
- Resilient, committed, and motivated staff.
- Strong sense of collegiality.

6.3 Recommendations for Improvement

The tables below categorise recommendations as being institutional/strategic or department level, in line with the guidance notes accompanying this template.

Institutional/Strategic Recommendations

Number	Recommendation	Additional PRG Comments
S.1	Invest in modern laboratory space to address current safety concerns: • Build an undergraduate teaching laboratory with ~100 student capacity for 1st year students. • Upgrade "synthetic" project / research space.	Reduce undergraduate student numbers per hood to max 3 per 1.8 m hood. New teaching space will give many immediate benefits to the department, and is also an opportunity to enhance cooperation between Chemistry, Physics and Biology. Align current synthetic space with modern safety standards; including more fumehoods and less bench space. Allow one 1.8 m hood per postgrad + project student and separate student write-up areas from the fumehoods.
S.2	Examine the available evidence and consider setting a threshold student-entry CAO point.	This could result in an informed strategy to cap student numbers, but also to considerably reduce the broad spread of student abilities entering the current course which places a huge burden on staff teaching first-year courses.
S.3	Urgently increase staffing in Chemistry to 20+. Look at ways to enhance the synergy between Chemistry, Physics and Biology departments.	It is necessary to provide a critical mass to staffing levels in Chemistry and a network of collaborations to ensure that world-class research can take place. Be receptive to how Chemistry wishes to brand its overlap with Biology. (There is a huge difference between Chemical Biology and Biochemistry.)
S.4	Improve communication between senior management and academics.	Benefits of consultation, and buy-in.
S.5	Examine how HoD are supported.	Presently there is no executive officer to assist HoD.

Recommendations to the Department

Number	Recommendation	Additional PRG Comments
U.1	Consider re-branding as a Department of Pure and Applied Chemistry.	Signal to SFI and industry the clear intention to conduct research that is fundable in the immediate and long-term future. Model along the lines of Strathclyde University, Glasgow UK and have a clear Analytical component to departmental structure and staffing.
U.2	Continue with planned changes to make the final-year courses more attractive. Consider the introduction of a 4th-year module in "Industrial Chemistry" or equivalent.	Students comment that they would like to see how their research might fit into industrial applications. Use current connections with industry to provide a series of invited mini-lecture series. Combine these with background theory from academics (e.g. LC separation techniques, followed by a series of lectures on applications from a collaborator/alumnus from Pfizer). Combine with site visits and workshops around these, and/or with lectures from the Business School around the generation of start-up companies. Assess a combination of exam and workshop material.
U.3	Help all faculty to apply for grants. Introduce an application mentoring system. Provide more conference funds. Help exploit all the possible links to business.	Examine use of research overheads to support developing new funding streams. Organise an open day for business. Find ways to facilitate starting faculty especially to form connections to companies through meetings, conferences and open days. Exploit the local environment and EU network grants such as ITN and COST programmes.
U.4	Persevere on interfacing with Life Sciences.	Biology and Healthcare are likely to remain drivers of research in the coming decades. Local contacts through the Human Health Institute, and directly to colleagues in Biology, should be facilitated through "themed speed-dating" or other means!
U.5	Focus "open-door" policy on targeted students; widen on-line support to all.	Given the student-staff ratio, an "open-door" policy for all students is unsustainable for effective time management of staff.

7. Appendices

7.1 Appendix A: Supporting Data

Table 1: Chemistry Department 2009-2019**.**

Maynooth Chemistry	**2008/9**	**2018/9**
Undergraduate FTE	156	267
Post Graduate FTE	35	21 PD 6, PhD 14, MSc(Res) 8
Staff (academic)	11.5	12.5
Staff (technical) **Staff (admin)**	7 1	8.8 2
Research Income	6.5M € (current)	6.4M € (2010-18 inclusive)
LC revision labs	530	1,137

Table 2: Broad Entry Science Degrees, numbers entering through CAO, min and median points for MU, DCU, TCD and DIOT for 2009, 2012, and 2018.

Year	MU CAO No.	MU Min	MU Med	DCU CAO No	DCU Min	DCU Med	UCD CAO No.	UCD Min	UCD Med	DIT CAO No	DIT Min	DIT Med
18	222	250	399	63	476	489	411	510	543	26	456	466
12	148	415	450	84	435	460	367	500	530	42	405	440
09	120	350	390	87	360	405	371	385	430	na	na	na

7.2 Appendix B: Peer Review Group Site Visit Timetable

Tuesday 2nd April 2019		
Time	**Description**	**Venue**
19:00	Convening of the Peer Review Group. Briefing by: Aidan Mulkeen, Vice President Academic and Registrar PRG agrees a Chair, and discuss the visit. Identification of any aspects requiring clarification or additional information. Dinner for members of the Peer Review Group and Director for Strategy & Quality & University Executive Member	Carton House Hotel Aidan Mulkeen Pietro Cicuta Alison Hulme Mary Murphy David Stifter
Wednesday 3rd April 2019		
Time	**Description**	**Venue**
8:30- 9.00	Convening of Peer Review Group	Council Room
9.00-9.45	Dr Jennifer McManus, Head of Department	Council Room
9.45 - 10.30	Group meeting with all Department staff (Head of Department recused)	Council Room
10.30- 10.45	Refreshments	
10.45- 11.30 11.30- 12.00	**Meet with Students:** Undergraduate Students (8) Postgraduate Students (8)	Council Room
12:00- 13.00	**Staff Group 1 (Technical)** Ms Ria Collery-Walsh Ms Barbara Woods Mr Noel Williams Ms Anne Cleary Ms Orla Joyce Mr Walter Walsh Dr Karen Herdman Ms Carmel O'Flaherty Dr Maryanne Ryan Ms Sarah Cannon Dr Michelle Sands Ms Orla Fenelon	Council Room

13.00 - 14:00	Working Lunch	Pugin Hall
14:00 - 15:30	Tour of facilities of Department & Refreshments escorted by HOD	Department
15.30- 16.30	**Staff Group 2 (Administrative)** Ms Donna Nicholson Ms Carol Berigan	Council Room
16.30- 17.00	**University Executive Members** Professor Aidan Mulkeen, VP Academic & Registrar Professor Ray O'Neill, VP for Research Professor Maria Pramaggiore, Dean of Graduate Studies	Council Room
17.00.- 17.30	**External Stakeholder/Phonecalls (3x10 mins)** Stakeholder 1: Marc Fenelon (Head of Food Programme, Teagasc) Stakeholder 2: Patrick Charbonneau (Duke University, USA)	Council Room
17:30- 18.00	PRG meeting – identification of any areas for clarification and finalisation of tasks for following day	Council Room
19.00	PRG private working dinner	Carton House Hotel

Thursday 4th April 2019		
Time	**Description**	**Venue**
9:00-9:30	Convening of Peer Review Group	Council Room
9.30-10.00	Professor Ronan Farrell, Faculty Dean	Council Room
10.00-10.30	**University Executive Members** Ms Rosaleen McCarthy, HR Director Ms Eliz Dunne, VP Estates & Capital Development	Council Room
10.30-11.30	**Staff Group 3 (Academic Synthetic Chemistry)** Professor Frances Heaney Dr Denise Rooney, Senior Lecturer Mr Muhib Ahmed, Lecturer Dr Trinidad Velasco-Torrijos, Lecturer Dr Robert Elmes, Lecturer Dr Diego Montagner, Lecturer Dr Tobias Krämer, Lecturer	Council Room
11.30-12.00	Refreshments	Council Room
12.00-13.00	**Staff Group 4 (Academic Physical and Analytical Chemistry)** Professor John Lowry Professor Carmel Breslin Dr John McCaffrey, Senior Lecturer Dr Elisa Fadda, Lecturer Dr Eithne Dempsey, Lecturer Ms Maryanne Dalton	Council Room
13:00-14:00	Working Lunch	Pugin Hall
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	Council Room
17:00	Refreshments and Exit of the PRG	Council Room