Quality Assurance / Quality Improvement Programme

Peer Review Group Report

School of Biotechnology
2nd – 4th December 2015

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Introduction

This Quality review has been conducted in accordance with a framework model developed and agreed through the Irish Universities Association Quality Committee and complies with the provisions of Section 35 of the Universities Act (1997) and the 2012 Qualifications and Quality Assurance Act. The model consists of a number of basic steps.

1. An internal team in the School/Faculty/Office/Centre being reviewed completes a detailed self-assessment report (SAR). It should be noted that this document is confidential to the School/Faculty/Office/Centre as well as the Review Panel and senior officers of the University.
2. This report is sent to a team of peer assessors, the Peer Review Group (PRG) – composed of members from outside DCU and from other areas of DCU – who then visit DCU and conduct discussions with a range of relevant staff, students and other stakeholders.
3. The PRG then writes its own report. The School/Faculty/Office/Centre is given the chance to correct possible factual errors before the PRG report is finalised.
4. The School/Faculty/Office/Centre produces a draft Quality Improvement Plan (QuIP) in response to the various issues and findings of the SAR and PRG reports.
5. The PRG report and the draft QuIP are considered by the Quality Promotion Committee (QPC) and University Executive.
6. The draft QuIP is discussed in a meeting between the School/Faculty/Office/Centre, members of the PRG, the Director of Quality Promotion and members of Senior Management. The University's responses are written into the draft document and the result is the finalised QuIP.
7. The PRG Report and the QuIP including the University's response is sent to the Governing Authority of the University, who approve publication in a manner that it sees fit.

   This document is the report referred to in Step 3 above.

Peer Review Group Report for the School of Biotechnology

1. Introduction and Overview

Location

The School of Biotechnology (the SoBT) is located in space of 2,958m^2 in the Lonsdale Building (X), which was constructed in 1998. The building also contains a bioprocessing pilot plant on the ground floor. Research laboratory space is spread over all four floors of the building. The teaching laboratories are housed mainly on the ground floor, with technical staff offices directly adjacent. Academic and School Administration offices are on the second floor. Lectures take place in classrooms within the Lonsdale Building, but also in classrooms across the Glasnevin campus.

An introductory meeting between the Peer Review Group (PRG) and the School of Biotechnology Self-Assessment Report (SAR) coordinating committee took place in room A204. A series of follow-on meetings took place over three days in which the PRG met with academic, administrative and technical staff of the SoBT, as well as with students of the School. Meetings also took place with DCU Support Services and external stakeholders (Alumni, employers). On day three, the PRG met with DCU Senior Management to discuss preliminary findings of the PRG.

Staff

The School of Biotechnology consists of 27.5 members of staff.

- 16 academic staff members (2 full professors (1 Professor Recently Retired, since the completion of the SAR), 1 associate professor, 8 senior lecturers, 5 lecturers) on the date of the visit. One additional lecturer is to commence employment in December 2015 taking the total academic staff to 16.
- 8.5 technical staff (7 full time, 1 4/5ths time and 1 part time)
- 1 Lab attendant
- 2 administration staff (1 full time and 1 part time)

Functions and Activities

The University comprises four faculties, with each faculty composed of a number of schools. The SoBT is located within the Faculty of Science and Health. Governance of the activities of the faculty is overseen at the faculty level by the Faculty Teaching Committee (FTC), the Faculty Research Committee (FRC) and the Faculty Management Board (FMB). Members of the SoBT have representation on each of these committees.

The Head of School is appointed for a three year term, following an interview process. The current Head of School is Dr Sandra O'Neill. The Deputy Head of School is appointed within the School, and gives support in decision-making to the Head of School. The School is managed by the School Executive Committee, chaired by the Head of School. Each member of the Executive Committee serves a three year term. The Executive Committee meets monthly during semesters, with additional meetings at other times as required. Along with the Head and Deputy Head, the Executive Committee is comprised of two staff representatives, the School Research Convenor, the School Teaching Convenor and the School Secretary as recording officer. The management structure can be seen in the figure 1 below.

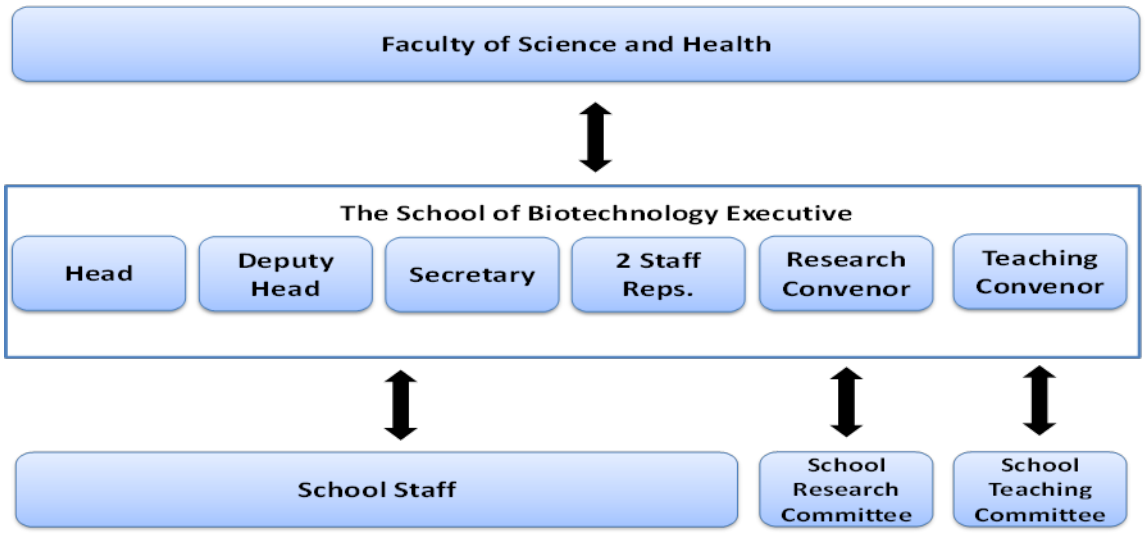

Figure 1. Management Structure of School of Biotechnology

The School Teaching Committee is chaired by the School Teaching Convenor and is comprised of the programme directors of the School's academic programmes, along with all staff supporting the School's academic programmes. The School Teaching Convenor is also a member of the FTC. The School Research Committee is chaired by the School Research Convenor and is comprised of all academic staff of the School. The School Research Convenor is also a member of the FRC.

The SoBT delivers two core undergraduate degree programmes, the BSc in Biotechnology and the BSc in Genetics and Cell Biology, as well as two core postgraduate degree programmes, the MSc in Bioprocess Engineering and the MSc in Biomedical Diagnostics. A third undergraduate degree programme, the BSc in Horticulture, developed in collaboration with TEAGASC, the agricultural and food development authority in Ireland, is in the process of being wound down. The SoBT also teaches significantly into 3 cross-faculty undergraduate programmes (BSc in Analytical Science, BSc in Chemical and Pharmaceutical Science, and

BSc in Environmental Science and Health) and provides service teaching to a number of Faculty and DCU degree programmes including Common Entry Science (currently chaired by the School), the BSc in Physical Education with Biology, the BSc in Marketing, Innovation and Technology, and four BEng programmes within the Faculty of Engineering and Computing.

The SoBT has had considerable experience in the development and delivery of structured PhD graduate studies programmes. *T3: Target-driven Therapeutics and Theranostics (2007)* was a 4 year structured PhD programme funded by the HEA under Cycle 4 of the Programme for Research in Third-Level Institutions. The School led the *BioAT: Bioanalysis and Therapeutics (2011)* programme, along with researchers from Dublin City University, the Royal College of Surgeons in Ireland (RCSI), National University of Ireland, Maynooth (NUIM) and Institute of Technology, Tallaght (ITT). The SoBT also delivers a School-specific graduate studies programme, *BioTranslate*, which commenced this academic year.

SoBT research takes place across six intersecting research themes: Bioprocess Engineering, Microbiology, Bioinformatics and Genomics, Cell and Molecular Biology, Immunology, and Biochemistry. These reflect the multi-disciplinary expertise of academic staff. A significant number of staff are affiliated to DCU-based national centres of excellence (National Centre for Sensor Research -NCSR; www.ncsr.ie, National Institute for Cellular Biotechnology -NICB; www.nicb.ie and the Biomedical Diagnostics Institute -BDI; www.bdi.ie and DCU Water Institute; http://www.dcu.ie/water/index.shtml) and to University designated research centres (Centre for Preventive Medicine http://www.preventivemedicine.ie/ and the International Centre for Neurotherapeutics ICNT). The SoBT has housed a number of spin-out companies and most recently, *Glycoselect*, which specialises in the development and production of Recombinant Prokaryotic Lectins (www.glycoselect.com).

The SoBT has been successful in attracting research funding from national sources including HRB, EI programmes, HEA, ICS, Teagasc, Government departments, EPA, SFI, IRC, and Irish Aid; international (Wellcome Trust, WHO, the Fulbright Programme, NIH, DCU-India, RBI/SWB Brazil); and from various industry sources.

In 2015, more than 90% of School staff were research active, defined in terms of publishing to international standard and acting as 1st/2nd PhD supervisor, and more than 77% of academics are publishing at international standard. Graduates from the School received FSH 'outstanding graduate research awards' in 2012, 2013, and 2014. Professor Martin Clynes was awarded a *Nature* Lifetime Achievement Award for Mentoring in Science.

2. The Self-Assessment Process

The Co-ordinating Committee
Dr Sandra O'Neill, Head of School and Chair of the Quality Review Group
Dr Phil Cummins, Deputy Head of School
Dr Dermot Walls, Research Convenor

Dr Rosaleen Devery, Teaching Convenor
Dr Greg Foley, Staff Representative
Ms Mary Rafter, School Secretary

Contributions were also made by Dr Anne-Parle McDermott (former Research Convenor) and Dr Patricia Carty (Chief Technical Officer).

Methodology adopted during process

The Committee met three times. In addition, the School quality review was a standing item on the agendas of both the School Executive and Staff Meetings since January 2015.

Feedback from a range of stakeholders was gathered by means of focus groups and surveys. Feedback from undergraduate and post-graduate students was solicited by focus groups, externally facilitated by Mr Tony Shone, Invisio Limited. An online survey was also used to target 4th year students. Feedback from DCU central services staff members was solicited by focus groups externally facilitated by Mr Tony Shone, Invisio Limited. Feedback from Alumni was solicited by telephone interviews by Mr Martin Leavy, DCU HR Training and Development Officer. Feedback from employers was solicited by telephone interviews by Mr Martin Leavy, DCU HR Training and Development Officer

In addition, relevant data were gathered from the following sources:

- Student statistical data were obtained through GURU ("Student Information Platform", designed and developed within DCU and used here for student data presentation and graphical analysis)
- Staff data were provided by the DCU Human Resources Department.
- School research metrics were collated with assistance from the Office for Research and Innovation Support and the Faculty manager.

Whole-School involvement in the SWOC Analysis was facilitated by a School all-staff "Away Day" externally facilitated by Mr Tony Shone, Invisio Limited. An internal working group was drawn from the SQRG and chaired by the Deputy Head of School. This sub-committee was formed after the Away Day to formalise the revised SWOC and to identify the strategic priorities and devise an implementation plan going forward.

3. The Peer Review Group Process

The Review Group

Professor Seamus Higson
Deputy Vice Chancellor (Sustainability and Enterprise), The University of Chichester

Dr. Siobhan Mitchell,
Medical Director and Company Director, Bristol-Myers Squibb, Swords Laboratories

Professor James P. O'Gara,
Head of Microbiology, School of Natural Sciences, National University of Ireland, Galway

Professor Bob Rastall *(Chair)*
Professor of Food Biotechnology, Reading University

Dr. Joseph Stokes,
Head of School of Mechanical and Manufacturing Engineering, Dublin City University

Dr. Siobhain McGovern *(Rapporteur),*
DCU Business School, Dublin City University

Site Visit Programme, 2nd – 4th December 2015

Day	Time	Peer Review Group (PRG) Activity/Meeting	Venue	Meeting No.
Day 1 Wed	12.30-14.00	Lunch with Director of Quality Promotion and available PRG members	1838 DCU	Arranged by QPO
	14.00-15.00	Briefing by Director of Quality Promotion; Guidelines provided to assist PRG during the visit and in developing its report.	CG35	Arranged by QPO
	15.00-15.45	PRG selects Chair. Discussion of main areas of interest and/or concern arising from the Self-Assessment Report (SAR).	CG35	Arranged by QPO
	15.45-16.00	*Coffee*	CG35	Arranged by QPO
	16.00-17.15	Consideration of SAR with Area Head and members of quality review committee. Short presentation by Area followed by discussion of SAR. *(Director of Quality Promotion in attendance)*	CG35	Arranged by QPO
	17:15-17.55	PRG Private meeting	CG35	
	18.00-19.00	Informal Reception – PRG, Area Head, Members of Quality Review Committee, Director of Quality Promotion	1838 DCU	Arranged by QPO
	19.00-20.30	PRG Dinner with Director of Quality Promotion	1838 DCU	Arranged by QPO
Day 2 Thurs	08.45-09.00	PRG Private meeting	H306	
	09.00-09.25	Area Head	H306	1
	09.30-09.55	Area Management Team or other Area staff	H306	2
	10.00-10.25	Area staff in functional or other groupings, or individually	H306	3A
	10.30-11.00	*Coffee*	H306	
	11.00-11.25	Area staff in functional or other groupings, or individually	H306	3B
	11.30-11.55	Area staff in functional or other groupings, or	H306	3C

		individually		
	12.00-12.25	Heads or Senior staff in Support / Service Offices working with Area	H306	4
	12.30-12.55	Administrative Staff representatives from Schools, Faculties or Research Centres and / or administrative staff representatives from varying levels within central administration	H306	5
	13.00-14:00	*Lunch*	H306	
	14.00-14.25	Tour of Facilities	TBA	
	14.30-15.25	Representatives from varying levels of academic staff familiar with Area, including Programme Chairs.	H306	6
	15.30-16.25 15.30-15.55 16.00-16.25	Representatives from students (if applicable) from various academic programmes. Mix of gender, undergrad, postgrad, access, traditional and others *Undergraduate Students* *Masters Students and PhD Students and Post-docs*	H306 and HG206	7
	16.30-17.15	Open forum for any member of Area staff	H306	
	17.15-17.55	Meetings with external stakeholders (alumni, employers, suppliers, Colleges of DCU, members of Governing Authority depending on relevance to Area…)	H306	8
	18.00-18.05	Area Head (update and clarifications if required)	H306	9
	18.05-18.15	PRG private meeting time	H306	
	19.30	PRG private dinner	Crowne Plaza Hotel	

Day 3 Fri	08.00-09.00	PRG Private meeting	HG306 and AG01	**Meeting No.**
	09.00-09.55	DCU Senior Management Group (SMG) *(Director of Quality Promotion in attendance)*	AG01	10
	10.00-10.25	Area Reporting Head (usually member of SMG)	AG01	11
	10.30-	*Coffee*		

	11.00			
	11.00-13.00	PRG private meeting time	H306	
	13.00-14:00	*Working Lunch* Clarification of outstanding issues for PRG if required	H306	
	14.00-16.25	PRG Prepare Exit Presentation *(Coffee provided at 16.00)*	H306	
	16.30-17.00	Exit Presentation – by PRG to Area Head and all members of Area staff *(Director of Quality Promotion in attendance)*	H306	12

Methodology

The PRG met with the Director of Quality Promotions who outlined the format of the visit, along with an overview of the aims and objectives of the review process. In the first private meeting, Professor Bob Rastall was chosen as Chairperson of the PRG. Following a general discussion of the SAR and appendices, several themes emerged as requiring exploration. Each member of the group took responsibility for a particular theme to explore during subsequent meetings.

See Appendix 1 for a list of attendees at each meeting with the PRG.

Participants engaged with the PRG in an open and frank way, giving valuable feedback on a wide range of issues. Overall, meetings with a wide number of School staff and students, central services staff, external DCU and non-DCU stakeholders, as well as the Senior Management Group, gave the PRG a comprehensive perspective on the School and its environment.

The PRG would have welcomed the opportunity to talk in greater detail to individuals from Research and Innovation Support. Although scheduled to attend, a representative was not available for the meeting. Given the importance of research-led Schools to the University strategy, this generated a significant information gap for the PGR in terms of exploring the kinds of support available to the SoBT to strengthen its research culture and focus and to mitigate the identified risk of retired/due to retire staff, on the Research output/reputation of SoBT. Several industry representatives could not attend the meetings. The PRG would have welcomed the opportunity to explore the perspectives of these external stakeholders in-depth.

Engagement with the SoBT staff and the Quality Promotions Office was professional, accommodating and supportive throughout the visit. The Director of Quality Promotion and SoBT staff were very helpful in providing additional information and data requested by the PRG at several stages during the review visit.

View of the Self-Assessment Report

Overall, the SAR was a comprehensive document, giving a good overview of the main functions and structures of the SoBT. The SAR and associated review process indicated a significant level of engagement in preparation for the Review. The SWOC analysis demonstrated considerable self-reflection by SoBT staff in determining their current position, and identifying some of the opportunities open to the SoBT. While the appendices were detailed and wide ranging, all information provided assisted the PRG in gaining in-depth knowledge of the SoBT, its current position and its future potential.

However, there were some gaps in the SAR. The document did not give the PRG a comprehensive overview of School research or a feel for the School's research strategy. Additionally, some data surrounding failure rates on the BSc in Biotechnology outlined in the APR included in the Appendices were at odds with data obtained during the visit from the Director of the QPO.

4. Findings of the Peer Review Group

4.1 Background, Overview, Strategy, Context

The School of Biotechnology has been to the forefront of biotechnology education in Ireland for many years. The successes of its graduates in both industry and academia demonstrate the continuing relevance of its degree programmes. The School's commitment to high quality teaching is inherent in all facets of its courses, and is prized by students, graduates and employers. This strong teaching philosophy has ensured that SoBT degrees continue to have high currency in relevant sectors. Further, it is apparent that the emphasis on practical teaching has led to graduates being considered "lab-ready" by the industry and that this constitutes an advantage in the employment market.

The third level education sector is operating in a new landscape in the light of significant and regular exchequer funding cuts. Schools are having to become more commercially aware, and work to grasp opportunities to generate non-Exchequer income streams. The SoBT has indicated its readiness to hone a more effective and wide-reaching commercial focus. The PRG recommends that the QuiP funding proposals post-review include a proposal for funding to engage with business development expertise, with the aim of advancing a suite of commercially focused and revenue generating products and services. To ensure that business development expertise adds value in the most efficient way, the PRG recommends that the SoBT continues to build on the process of reflection begun at the Away Day by working towards the refinement of its mission and strategy. If the School has a clearer perspective on where it sees itself in the

medium term, this will ensure that it can work more effectively with contracted business development expertise. The PRG also suggest that the School establishes an Industry Advisory Panel, primarily to advise on teaching (see below), but also to provide a commercial input into the identification of business development opportunities.

Throughout the course of the visit, the PRG was struck by some significant communication deficits that exist on three levels, (a) within the SoBT itself between different groups, (b) between the SoBT and Research Centres, and (c) between the SoBT and the wider University environment. It is clear that the SoBT appreciates the weaknesses in its relationship with key DCU decision-making groups and committees but the PRG would caution against any initiatives that might increase the already substantial administrative burden for staff. The PRG agrees strongly with the SWOC analysis conclusion that the establishment of MOUs with research centres presents an opportunity for the SoBT on a number of fronts. Further leverage for the School could be gained by building a more robust and formalised relationship with research centres.

Considerable opportunities exist to improve internal communications within the SoBT itself. From the standpoint of the PRG, it seems that constituent groups within the School have become isolated and inward looking. While each group displays a high level of collegiality, the School appears to have become divided into isolated silos which prevent it from developing an inclusive and sustainable strategy, utilising all its human capital resources to the highest potential.

Finally, the University and Faculty should add depth to their communications with the SoBT to ensure a more complete understanding of the principles behind the allocation of budgets across the University and an awareness of DCU Capital Investment Fund/Philanthropy opportunities.

4.2 Building a Spirit of Enterprise

The PRG commends the SoBT on its close alliance with associated commercial sectors to provide cutting edge research and work-ready graduates with a strong applied focus. The School has extensive and long-standing links with associated commercial sectors through its Alumni, the Intra placement programme, and through industry funded research. This provides the SoBT with a considerable advantage in developing stronger links to seek out revenue generating opportunities. With the help of business development expertise and the institution of an Industry Advisory Panel, the PRG feels that the SoBT is ideally placed to leverage its existing research, teaching and infrastructure to develop products and services with a strong commercial appeal to a range of rapidly growing sectors such as BioPharma, biomarker and diagnostic solutions, and the brewing industry.

Opportunities also exist to develop a more commercial focus within the research envelope of SoBT, to enhance its Enterprise focus in order to contribute to DCU's drive to forge a reputation

as “Ireland’s University of Enterprise” (https://www.dcu.ie/university-of-enterprise.shtml). The PRG feel that SoBT need to be proactive in identifying such opportunities that they can exploit to bring in revenue through partnership programmes with Pharma, Biotech, Manufacturing and Bioprocessing. The ability to engage in reciprocal value added research will strengthen the University of Enterprise stance within DCU.

Potential opportunities should be explored in the development of executive education, both in the delivery of short courses and bespoke Masters degree programmes. It is important however that any offerings leverage on existing School resources rather than generating a need for new resources, to get the best out of any revenue. Offerings should build on the core curriculum already existing within the School, with some bespoke additions, rather than depend on the generation of new stand-alone programmes. The SoBT has already begun to exploit e-learning technologies to develop international teaching collaborations, with Arizona State University. The SoBT should capitalise on this expertise to streamline new offerings in a way that has minimal impact on teaching workloads. Such programmes should be developed with an industrial/International need in mind, along with attracting some of SoBT’s self-grown undergraduates to meet the future needs of the Healthcare sector.

Opportunities may also exist to make specialist teaching/research laboratory equipment expertise available to industry on a contract basis. This would generate revenue and may also lead to new research contracts with industrial partners. The new Industry Advisory Panel could provide valuable input in identifying such opportunities. Additionally, the relationship with NIBRT should be strengthened, positioning the SoBT at the forefront of offerings, concentrating resources within, and maximising access to resources elsewhere, to drive the diversification of offerings of the SoBT.

4.3 Organisation and Management

The SoBT is led by the Head of School and the School Executive. While this structure is appropriate to the management of a School of this size, the PRG felt that whole-school representation should be strengthened by the addition of a representative from the technical staff and from the post-doctoral students on the School Executive. This would help to overcome some of the within-School communication deficits outlined in 4.1 above. To foster greater involvement of the technical staff, the PRG recommends that the Head of School establish a regular meeting with this group, and that the group itself establishes closer links to technical staff in other Schools at the faculty level.

The teaching allocation is distributed evenly across academic staff by the Head of School. However, when research and administration is taken into account, this has led to an inequitable allocation of workload activities. The PRG recommends that an alternative workload model that incorporates all dimensions of workload be developed. The PRG acknowledges the challenge this poses, and while it recognises that a model that might work well in one School might not be

fit for purpose in another, some advantage could be gained from looking at workload models in operation elsewhere in the University. The DCU "Principles for the Academic Workload Allocation" provides best practice guidelines that should underpin the development of a more robust model.

4.4 Staffing and Accommodation

A series of retirements and resignations have provided a significant challenge to the School over the past three years, particularly in light of the government's Employment Control Framework. In addition, the passing away of a highly valued colleague, Dr Michael O'Connell, in 2014, has had a visible impact on staff morale.

Staffing challenges are likely to persist in the medium term, and it is vital that the School devises a clear and cogent staffing strategy to be presented to Senior Management. This strategy needs to be aligned closely to the School's research strategy, and not simply to address short term teaching needs. It is critical that the HR and Finance departments work with the School in a timely and constructive way to ensure the development, and implementation of a considered plan to guarantee the recruitment of strategic hires for the School. The PRG acknowledges the constraints of the budgetary environment under which the University operates. However, strategic hires are crucial to the ability of the School to roll out the successful implementation of its medium term strategy.

Technical staff are crucial to the further development of the School. In the PRG meeting, they expressed a desire to become more involved and aid the development and delivery of the teaching lab practicals. The PRG feels that technical staff can provide a highly capable and proficient support to over-stretched academic staff, plus it was apparent that technical staff had no/very little involvement in research activities, as this is currently mostly concentrated within the research centres. Central to this is the institution of a more collaborative culture between academic and technical staff, and the provision of tailored professional development opportunities for technical staff. Secretarial staff also supply a crucial support to the School; therefore Faculty level support must be provided to the School during periods of leave.

Staff and students expressed deep concerns about the existing physical infrastructure and equipment of the SoBT. The Senior Management Group and the Dean of Faculty acknowledged the constraint that this places on the School's ability to grow revenue through the traditional method of developing new programmes. Maintaining existing ageing equipment is also a problem and the PRG recommends that the School identifies all potential sources of funding available at the University level to maintain current capacity. The SMG outlined some future expansion plans that should ease these pressures. However, if expansion plans are focused on research centres, it is imperative that formalised relationships are generated between the School and associated research centres to ensure a more efficient and collaborative approach to available services.

4.4 Teaching

The School has a rich heritage in the provision of programmes to meet sectoral needs for high-calibre graduates, of which it can be very proud. The BSc in Biotechnology has had an impressively long product life-cycle for a niche programme, which would suggest an ability of programme developers to respond dynamically to employer needs. This heritage places the School in a strong position when it comes to ensuring that it continues to meet the needs of related sectors into the future.

In its SWOC analysis (reproduced in 4.9 below), the School has identified the provision of innovative and industrially relevant degree programmes as its strength. It has also identified the challenge for the School in maintaining this quality delivery against a backdrop of high teaching and administration loads. The PRG believes that there are several ways in which the SoBT can streamline the delivery of its programmes according to lean services principles, without damaging the quality of delivery or institutional reputation.

The PRG found evidence of lecture contact hours across many undergraduate modules that are beyond the 24 hour norm for five credit modules, and of over-assessment within individual modules. Much could be done to reduce teaching workloads to sustainable levels within existing modules. The PRG also found evidence of duplication across modules, and some evidence of modules that were out of date given current sectoral requirements. In a multidisciplinary programme, it can be all too easy for staff to focus solely on the modules they deliver and overlook the role they have to play in the development of the programme as a whole, through its programme/learning outcomes. There is a challenge for academic staff to ensure that their focus is maintained at the level of the programme, rather than in safeguarding modules at a discipline level.

The focus for the review of teaching should be on the identification of a core set of modules that form a central pillar for undergraduate delivery. Industry needs could then be met by introducing new modules around this central pillar of modules, rather than by developing new stand-alone programmes. The PRG acknowledges that progress has been made already in regard to the development of a common suite of first year modules, but asks the School to consider whether similar common modules could be identified for subsequent academic years. This would enable the School to avoid the lengthy process of validation and accreditation that accompany the development of new stand-alone programmes, and to develop much more rapid reaction times to meet industry needs.

The specification of graduate attributes under the DCU Generation 21 programme, gives the School the opportunity to refocus its delivery of programmes in terms of the development of the skills and competencies valued by potential employers. The PRG meeting with external stakeholders suggested problem-solving, critical self-reflection, technical skills, written communication skills and oral communication skills as crucial skills and competencies for the

generation of industry-ready graduates. These should serve as a guiding principle for the review process.

The PRG has recommended the establishment of an Industry Advisory Panel to cement and formalise the links between the SoBT and employers and to ensure that the SoBT retains its status as a premier provider of work-ready graduates in the light of increasing competition from a number of other third level institutions. An Industry Advisory Panel would provide the SoBT with invaluable information as to future strategic directions and potential growth areas in relevant sectors. In this way the SoBT can ensure proactive responses to industry need. The role of the panel should not usurp the School's academic expertise in items such as the decisions regarding modes of assessment.

The PRG identified a potential significant resource in the technicians – they were very positive about taking on more responsibilities in lab-based teaching/development and having some research support involvement. A move to facilitate this would not only present an opportunity to relieve pressure on academics. It would also acknowledge and value the specific skills and competencies of technicians. This necessitates a collaborative process embedded in formalised communication links. Technician representation on the School Executive, the Teaching Committee and the Research Committee, as well as regular meetings between the Head of School and the Technicians group is crucial to developing these resources in a meaningful way.

4.5 Research

The PRG formed the opinion that the SoBT was focused primarily on delivery of its teaching programmes and that research activities were largely organised and supported by the affiliated research centres. Indeed the PRG believe that the research activities of the SoBT are not as visible as they should be and that, based on the SAR and interviews with current graduate students and postdocs, integration of the SoBT and the affiliated research centres could be improved. The PRG recommend that the relationship between the SoBT and research centres be placed on a more formal footing so that the expertise and infrastructure of the research centres are fully available to School researchers and vice versa. Currently, interactions between School researchers and the research centres appear to happen at an informal level.

This issue was probed further with the Senior Management Group, where the President made it clear that Schools are expected to develop and drive research activity in the university, which in turn should inform the establishment and activity of research centres. The PRG therefore recommends that the SoBT prioritise the development of a new research strategy that refines the existing research themes and in so doing, develops new opportunities and pathways for sustainable, multidisciplinary research. The PRG believe that the SoBT should play a more visible, leadership role in biological sciences research within DCU. The six current research themes outlined in the SAR and on the School website (which are not identical) are essentially the subject areas of the various academic staff (microbiology, immunology etc). These need to

be refined into strategic areas that align with the University research strategy in order to support the research activities of academic staff and inform the recruitment of future academic staff.

The PRG appreciates that the development of a new research strategy and expanded research activity can only be achieved through the operation of an effective and equitable workload model that fully integrates the workload associated with research as well as teaching and administrative roles. The PRG noted that the current workload model distributes teaching loads equally irrespective of differences in staff research activities.

4.7 Student Perspective

In PRG meetings, SoBT students were enthusiastic advocates for their programmes. The level of pastoral care these students receive is considerable and indicates a very supportive teaching environment. This was also evident from the focus group and survey data supplied in the SAR. Notwithstanding the high regard students have, some concerns were raised. These included the relevance of some content of undergraduate programmes, the quantity of assessments in undergraduate programmes, inconsistencies in quality of feedback across modules in both undergraduate and Masters programmes, the absence of a reading week, and opportunities for PhDs to present their research and receive feedback.

Space could be made within existing structures for greater formal communication links between staff and students. Recommendations in this respect are listed in section 5, under the heading Teaching.

4.8 Staff Perspective

It is clear that staff working life has been affected by the passing away of a valued colleague, as well as by a series of retirements and resignations in recent years. Staff have had to deal with difficult situations against the backdrop of severe financial constraints. Issues such as career progression, promotion opportunities and processes, and University responses to staffing gaps, were raised. Nonetheless, staff are focused on the future; they have indicated an awareness of the need for change to give the SoBT greater traction in the medium term.

4.9 Overall Analysis of Strengths, Weaknesses, Opportunities and Concerns

The PRG felt that overall the analysis of strengths, weaknesses, challenges and opportunities (SWOC) undertaken by the SoBT and reproduced below was comprehensive and realistic. However, more reflection could have provided more of a balance between strengths and opportunities on the one hand, and weaknesses and challenges on the other, particularly in the area of research.

Strengths	**Weaknesses**
1. **Education:** Innovative multidisciplinary "hands-on" degree programmes at BSc, MSc and PhD levels – quality reviewed, industrially relevant, proven reputation, and high student intake 2. **Staff:** Multidisciplinary staff (life sciences and engineering) with a high level of School loyalty and collegiality. Well-balanced age/gender profile. 3. **Research funding:** Success with many leading national and international funding bodies (and the private sector) – SFI, HRB, Enterprise Ireland, Wellcome, IRC, EPA, NIH, EU Horizon 2020, HEA (PRTLI Cycles 1/3/4/5), and Research Brazil Ireland/Science Without Borders. 4. **Facilities:** Access to state-of-the-art research facilities (BRU, NICB, NCSR, T3, NRF, STEP).	1. **Staffing constraints:** Chronic shortage of academic staff and technical support (particularly in the bioprocessing/bioinformatics fields), lack of professional development opportunities for technical staff – when combined with pressure to introduce new programmes and year-on-year increases in student intake, this has led to unsustainably high teaching/administration loads and predictably detrimental consequences for teaching quality, programme viability, and research output. 2. **Space / equipment constraints:** BT pilot plant and core instrumentation teaching facilities barely fit-for-purpose, lack of dedicated bioinformatics space, ageing equipment base, and insufficient lab space to handle growing numbers of undergrads creating serious timetabling problems. 3. **Administrative challenges:** Extreme budget constraints (drastic projected reduction of School operating budget), insufficient admin support (HoS should have a PA "independent" of School secretary), and too much administration routinely "pushed back" onto the HoS from other University offices. 4. **School/Centre links:** Weak *functional* linkages between the School and Centres (NICB, ICNT).
Opportunities	**Challenges**
1. **Staffing initiatives:** To get SoBT staff into key positions of influence within DCU, to pursue strategic recruitments following scheduled retirements, and to upskill both academic and technical staff in key activities. 2. **School/Centre links:** To establish mutually beneficial MOUs between the School and Centres with regard to research collaboration, teaching programme delivery, core facility sharing, centre membership criteria, and timely postgraduate completion. 3. **Educational initiatives:** To establish new degree programmes (e.g. BSc in Human Biosciences), to expand the BT educational space through the "incorporation" programme, to have more active engagement of alumni for teaching/INTRA purposes, and to provide streaming options at 4th yr BSc level. 4. **Industrial relevance:** To develop a realistic School/Industry strategy to enhance the relevance of our programmes (e.g. BT, MSBE), to channel industrial expertise into our programmes through new/existing industrial links, and to engage industry on matters of equipment acquisition/upgrade.	1. **Staffing:** To prevent staff losses (to other jurisdictions) arising from excessive workloads, limited promotional prospects, low scientific prioritization, national research funding cuts, and headhunting, and to maintain/increase staff headcount in a HEI environment determined to "reduce" headcount. Staff shortages threaten programme *quality*, *viability*, and *uniqueness*. 2. **Teaching quality:** To maintain programme quality and deliverability despite staffing shortages, increased workloads, shrinking teaching/demonstrating budgets, and growing student numbers, to creatively address the steady decline in undergraduate educational standards evident within our recent student intakes, and to ensure our existing programmes remain fit-for-purpose externally. 3. **Research income / infrastructure:** To maintain and enhance research grant income levels, and to sustain, upgrade, and if necessary, replace our existing ageing equipment base. 4. **Competition:** To avoid erosion of our educational space by competing Universities (UCD, DIT).

5. Recommendations for Improvement

Indication of Priority:
P1: A recommendation that is important and requires urgent action.
P2: A recommendation that is important, but can, or perhaps must, be addressed on a more extended time scale.
P3: A recommendation which merits serious consideration but which is not considered to be critical to the quality of the ongoing activities.

Level(s) of the University where action is required:
A: Area under review
U: University Senior Management

No.	Priority	Level	Recommendation
Strategy			
1	P1	A/U	Contract in business development expertise to work alongside the School to develop a robust business plan for teaching, research and enterprise
2	P1	A	Adopt a whole-school, fully collaborative approach to the development of a clear and concise mission, vision and strategy for the School
3	P1	A	Develop a School-focused research strategy to define themes such that they are mapped cogently onto University Research Strategy
4	P1	A	Build up a full 360^0 communications structure across the whole School, between the School and the Research Centres, along with the School and Faculty, with a principle of bottom-up communication at its core
5	P2	A/U	Consider rebranding of School and programmes as part of this strategic development
Entrepreneurship			
6	P1	A	Actively pursue independent enterprise income by leveraging research
7	P2	A	Develop a consultancy profile through the development of non-degree executive programmes for biotechnology sector firms
8	P2	A	Seek industry partner for the development of a bespoke Masters level programme, with a strong e-learning component
Organisation and Management			
9	P1	A/U	Develop a transparent, numerically based, faculty-wide workload model that recognises contributions not only in teaching, but also in administration and research.
10	P1	U	Improve approaches to the communication of budget processes and allocation of funding.
11	P1	A	Develop a succession planning process for the position of Head of School
12	P1	A/U	Develop a programme of structured mentoring for technicians
13	P1	A	Have a Technician staff representative on the School Executive, Teaching and Research Committees
14	P1	A	Establish a regular meeting between the Head of School and Technician staff
15	P1	A	Rotate School management roles every three years
16	P1	A/U	Identify a faculty-level Technical committee which would report to Faculty Management Board
17	P1	A	Build up communications conduit with key central services to ensure that central services are aware of needs and concerns of the School
18	P1	A/U	Ongoing formal biannual progress reporting and monitoring to the Quality

			Promotions Unit to ensure that review recommendations are implemented in a timely fashion
19	P2	A/U	Develop appropriate structures to ensure a deeper integration of School and associated RCs to enhance research-led teaching and access of School researchers to RC infrastructure.
Staffing and Accommodation			
20	P1	A/U	The HR and Finance departments to work more closely with the Head of School to ensure a strategic recruitment plan for strategic hires and the implications for the School budget
21	P1	A	Prepare and present a staffing strategy to the Senior Management
22	P1	A	Take steps to ensure sample security by installing freezer alarms
23	P1	A	Develop a professional development plan for Technicians
24	P1	A	Consider how administration roles might be optimised to reduce Staff workload. One example would be to amalgamate the chairs of the undergraduate programmes.
25	P1	A	Identify a process with the Faculty administration to provide cover to the School Office during periods of leave
26	P2	A/U	Funding for the upgrading of facilities and equipment should be prioritised through the University's Capital Investment Fund
27	P2	A/U	Seek external funding for a privately endowed Chair
Teaching			
(a) Teaching and Links with Industry			
28	P1	A	Establish a permanent industry advisory panel to ensure the continuing relevance of programmes to external stakeholders
29	P1	A	Work with industry advisors to "future-proof" undergraduate programmes by ensuring that individual module content meets future industry requirements
(b) Further Rationalisation and Efficiencies			
30	P1	A	Initiate a review of all undergraduate modules to reduce the amount of assessment
31	P1	A	Ensure that assessments are aligned to specified learning goals such as problem solving ability, technical skills, written and oral communication skills
32	P1	A	Review all undergraduate modules to ensure that lecture contact hours do not exceed the 24 hour norm for five credit modules
33	P1	A	Continue the reform of undergraduate programmes by removing redundant modules and reforming the resource-intensive lab practice
34	P1	A	Increase the number of industry-focused MSc modules to fourth year undergraduates
35	P1	A	Ensure that any new programme proposals are fully integrated into the newly developed School strategy and should leverage core curriculum from existing modules
36	P1	A	Clearly identify opportunities for attracting international students on appropriate programmes
37	P2	A	Move to extend the Intra work placement on undergraduate degrees
(c) Capturing Success in Teaching			
38	P1	A	Introduce metrics to capture impact of teaching innovations
39	P1	A	Introduce metrics to capture the extent to which programmes meet individual programme learning outcomes and in turn University graduate attributes

			(d) A Whole-School Collaborative Approach to Teaching
40	P1	A	Involve technicians in the development and delivery of practical work
41	P1	A	Ensure that doctoral and post-doctoral students are given teaching experience to enhance their skills and competencies, within the University Academic Framework. The Head of School should make all teaching allocations.
42	P1	A	Ensure that undergraduate class representatives attend programme board meetings
43	P1	A	Introduce a reading week for undergraduate programmes in semester one and two, in response to student demand
44	P1	A	Ensure student representation in future discussions regarding the further rationalisation of undergraduate programmes
45	P1	A	Develop a School-wide set of criteria for feedback mechanisms in respect of assessments. Feedback should be timely, consistent and of good quality
46	P1	A	Focus on quality of teaching as informed by an annual student survey
47	P1	A	Work with the Careers Service to ensure that undergraduate and postgraduate students have access to the full suite of services regarding career development
Research			
48	P1	A	Align the appointment of academic staff within SoBT to defined strategic research themes
49	P1	A	Enhance links between the School and the Biological Research Society to develop a meaningful and collaborative research community spirit
50	P1	A	Consider the inclusion of post-doc representation onto the School Executive
51	P1	A	Include PhD and post-doctoral representation on the School Research Committee
52	P1	A	Develop an induction package that welcomes new PhD students to the School

Appendix One

PRG Visit Schedule

Meeting No:	Name(s)	Position
1	Dr. Sandra O'Neill	Head of School of Biotechnology
2	Dr. Sandra O'Neill	School of Biotechnology Executive Committee, Head of School
	Dr. Phil Cummins	School of Biotechnology Executive Committee, Deputy Head of School
	Dr. Dermot Walls	School of Biotechnology Executive Committee, School Research Convenor
	Dr. Rosaleen Devery	School of Biotechnology Executive Committee, School Teaching Convenor
	Dr. Greg Foley	School of Biotechnology Executive Committee,/Associate Dean for Teaching & Learning
	Dr. Jenny Lawler	School of Biotechnology Executive Committee/ MSc. In Bioprocess Engineering Programme Chair
3A	Dr. Sandra O'Neill	Head of School of Biotechnology / BSc. In Horticulture Programme Chair
	Dr. Greg Foley	School of Biotechnology/Associate Dean for Teaching & Learning
	Prof. Richard O'Kennedy	School of Biotechnology/Scientific Director of Biomedical Diagnostics Institute, Dublin City University
	Dr. Brid Quilty	School of Biotechnology/BSc. In Environmental Science & Health Programme Co-ordinator
	Dr. Rosaleen Devery	School of Biotechnology/Teaching Convenor/Chair for Common Entry into Science
	Dr. Tim Downing	School of Biotechnology
	Dr. Dermot Walls	School of Biotechnology/Research Convenor
	Prof. Christine Loscher	School of Biotechnology/Director, Health Technologies and Healthy & Ageing Society, Research & Enterprise Hub/ Academic Lead -Nano-BioAnalytical Research Facility
	Prof. Paul Cahill	School of Biotechnology/BSc. In Genetics & Cell Biology Programme Chair 2015/16
	Dr. Phil Cummins	School of Biotechnology/Deputy Head of School
	Dr. Jenny Lawler	School of Biotechnology/MSc. In Bioprocess Engineering Programme Chair
	Dr. Ciaran Fagan	School of Biotechnology
	Dr. Brendan O'Connor	School of Biotechnology/BSc. In Analytical Science Co-ordinator (Biology Option)
	Dr. Niall Barron	School of Biotechnology/BSc. In Biotechnology Programme Chair 2015/16/Director, National Institute for Cellular Biotechnology, DCU

	Dr. Anne Parle-McDermott Mr. Brian Freeland	School of Biotechnology Lecturer School of Biotechnology Lecturer
3B	Dr. Patricia Carty Ms. Monica McGorman Ms. Teresa Cooney Ms. Allison Tipping Ms. Katarzyna Zdrojewska Ms. Janice Cunningham Mr. Graham Dodrill Mr. David Cunningham Mr. John Traynor Ms. Claire Enright Ms. Mary Rafter	Chief Technical Officer Senior Technical Officer Senior Technical Officer Senior Technical Officer/School Purchasing Officer Lab Attendant Senior Technical Officer Senior Technical Officer Senior Technical Officer Senior Technical Officer Invoicing School Secretary
3C	Dr. Arlene Glasgow Dr. Allison Aldridge Dr. Laura Collins Dr. Izabela Marszalowska Dr. Linda Hughes	Post-Doctoral Researcher Post-Doctoral Researcher Post-Doctoral Researcher Post-Doctoral Researcher Post-Doctoral Researcher
4	Ms. Barbara McConalogue Prof. Lisa Looney Dr. Ana Terres* Mr. Brendan Gillen Ms. Lisa Callaghan Ms. Gillian Barry Mr. Ronan Tobin Ms. Bernadette Dowling Mr. Michael Kelly Mr. Paul Smith	Director, DCU Information Systems & Services Head of Graduate Studies Office Director, DCU Research & Innovation Services Financial Operations Accountant, DCU Finance Office Science Librarian, DCU Library Student Awards Manager, Registry Faculty Manager, Faculty of Science & Health Assistant Faculty Manager, Faculty of Science & Health Director, DCU Estates Office Head of DCU International Office
5	Mr. Michael Burke Dr. Damian O'Donoghue Ms. Carolyn Wilson Ms. Mairead Callan Ms. Sharon Whyte Mr. Ciaran McKenna Ms. Sonya McKenna	Faculty of Science & Health Facilities Manager DCU Bio-Resource Unit DCU Bio-Resource Unit Administrator, National Institute for Cellular Biotechnology, DCU PA to the Director/Administrator, International Centre for Neurotherapeutics, DCU Faculty Administration Team, Faculty of Science & Health Faculty Administration Team, Faculty of Science & Health
6	Dr. Brien Nolan Prof. Enda McGlynn Dr. Kieran Nolan, Dr. Ronan Murphy	Head of School of Mathematical Sciences Head of School of Physical Sciences Head of School of Chemical Sciences Deputy Head, School of Health & Human Performance

	Dr. Blanaid White	Chair of Environmental Science & Health Programme, School of Chemical Sciences
	Dr. Veronica Lambert	Deputy Head, School of Nursing and Human Health
	Dr. Mary Pryce	Chair of Analytical Science Programme, School of Chemical Sciences
	Prof. Christine Loscher	School of Biotechnology/Director, Health Technologies and the Healthy Ageing Society Hub
	Dr. Niall Barron	School of Biotechnology/Director, National Institute for Cellular Biotechnology, DCU
	Mr. Joseph McManus	Director, Biomedical Diagnostics Institute, DCU
	Prof. Robert Forster	Director, National Centre for Sensor Research, DCU
7	Mr. Richard Lalor	Postgraduate Student – Year 2
	Mr. Sean Fitzgerald	Postgraduate Student – Year 1
	Ms. Kim Connick	Postgraduate Student – Year 1
	Ms. Niamh Hunt	Postgraduate Student – Year 2
	Mr. Shane David Kelly	MSc. In Bioprocess Engineering – Full-time/Year 1
	Mr. Killian Corcoran	MSc. In Bioprocess Engineering – Part-Time/Year 3
	Mr. Andrei Ciobanu	MSc. In Biomedical Diagnostics– Year 1
	Ms. Louise Coleman	MSc. In Biomedical Diagnostics– Year 1
	Mr. Callaghan Commons	BSc. In Analytical Science – Year 2
	Ms. Nicole O'Connor	BSc. In Analytical Science – Year 2
	Mr. Sean O'Keeffe	BSc. In Biotechnology – Year 3
	Mr. Glenn Fitzpatrick	BSc. In Biotechnology – Year 4
	Mr. Mohammed Shariq Khan	BSc. In Environmental Science & Health – Year 1
	Ms. Ciara Whittaker	BSc. in Environmental Science & Health –Year 2
	Mr. Anton McDonnell	BSc. In Genetics & Cell Biology – Year 3
	Ms. Ali Taylor	BSc. In Genetics & Cell Biology – Year 4
8	Ms. Lisa Tang	Life Sciences Technical Sales Specialist, Medical Supply Company Ireland
	Mr. Brian MacDonnell	Sales Specialist, Roche Diagnostics Ltd.
	Dr. Paul Leonard	Director of In Vitro Assay Development, Vaccinogen Ireland R&D Company
	Mr. Nicholas Sweeney	Senior Manager GCMC Bios & Vaccines, Pfizer Ireland Pharmaceuticals
	Ms. Sharon Stapleton	R&D Manager, EKF Diagnostics Ltd.
	Dr. Niamh Gilmartin	Lecturer, Dublin Institute of Technology
	Dr. Keith Rochfort	University College Dublin School of Medicine & Medical Science
	Dr. Joseph deCourcey	Post-Doctoral Research Fellow,Trinity College Dublin
	Dr. Mark Lynch	Post-Doctoral Research Fellow,Trinity College Dublin
	Dr. Noeleen Loughran	QA and Regulatory Affairs Assistant, Sigmoid Pharma
9	Dr. Sandra O'Neill	Head of School of Biotechnology
10	Prof. Brian MacCraith	DCU President
	Prof. Daire Keogh	President St. Patricks College
	Prof. Eithne Guilfoyle	Vice-President Academic Affairs (Registrar)

	Prof. Alan Harvey Mr Trevor Holmes Dr Declan Raftery Prof. John Doyle Dr Anne Sinnott Prof. John Costello Prof. Barry McMullin Ms Marian Burns Mr Ciarán McGivern	Vice-President Research and Innovation Vice-President External Affairs Chief Operations Officer Dean of Faculty of Humanities and Social Sciences Dean of DCU Business School Dean of Faculty of Science & Health Dean of Faculty of Engineering & Computing Director of Human Resources Director of Finance
11	Prof. John Costello	Faculty of Science & Health Dean
12		All staff invited