TRINITY COLLEGE DUBLIN

PROVOST'S REPORT TO COUNCIL ON THE REVIEW OF THE SCHOOL OF BIOCHEMISTRY & IMMUNOLOGY

1. INTRODUCTION

This report presents the outcome of a review of the School of Biochemistry & Immunology. An external peer review visitation was undertaken from the 12th – 14th December 2011 by Prof Sheena Radford, University of Leeds; Prof Jacques Piette, University of Liege & Prof Robert B. Gennis, University of Illinois. The internal facilitator was Dr Brian Foley, School of Engineering, Trinity College Dublin.

The report is based on (i) feedback from the External Reviewers received on the 1st February 2012, (ii) a submission from the School of Biochemistry & Immunology received on the 5th March 2012 and (iii) a submission from the Pro-Dean of Engineering, Mathematics & Science received on the 26th January 2012.

The main purpose of the School review is (a) to provide a structured opportunity for the School to reflect on its activities and plans for development, while benefiting from a constructive commentary by senior colleagues external to College; (b) to ensure that quality and standards in teaching, research and administration are being maintained and enhanced and that areas of concern in this regard are identified and addressed. Each School in College is reviewed systematically once every seven years.

2. OVERVIEW OF THE SCHOOL

2.1 Aims and Objectives of the School

The School of Biochemistry and Immunology (B&I) was formed in 2005 and comprises the disciplines of Biochemistry and Immunology. The School of B&I is part of the Faculty of Engineering, Mathematics and Science and is a dynamic research-led school with extensive undergraduate, postgraduate and teaching programmes. The School of B&I has recently consolidated almost all of its research laboratories and teaching facilities to a brand new state-of-the-art Trinity Biomedical Sciences Institute (TBSI) that is the Trinity and Irish flagship for Biomedical research. A key mission of the School of B&I is to deliver high quality research-led teaching. The School aims to be world-renowned for its reputation in research and teaching, to be the first choice for top class students who are eager to learn about the key biochemical and immunological mechanisms of life from internationally recognised research scientists, leading to productive, successful careers in these areas.

2.2 Programmes to which the School provides teaching

Undergraduate:

The School of B&I currently runs four undergraduate degree programmes:

- Biochemistry with Cell Biology,
- Biochemistry with Structural Biology,
- Biochemistry with Immunology
- Molecular Medicine (run jointly with the School of Medicine).

Beginning September 2012, reorganised degree courses offered to rising JF students will be

- Biochemistry
- Immunology
- Molecular Medicine

Postgraduate:
In October, a new MSc course in Immunology will commence, consisting of taught modules and a research project.

2.3 Research

There are currently 29 active research groups with €34m in research funding, 83 PhD students and 65 postdoctoral researchers working in the School. The School has particular strengths in immunology and neuroscience, two of the seven major College research pillars. Research groups in the School are studying aspects of inflammation, innate and adaptive immunity, cancer, obesity, protein structure, metabolism, neurobiology, nutrition, enzymology, systems biology, biotechnology, bioprocessing and vaccines. Three Nobel laureates (Doherty, Hoffmann & Beutler) have recently agreed to become adjunct professors to the School and contribute to its teaching curriculum.

2.4 Summary Statistical Profile of the School for the Academic Year 2010/11[1]

Full-time Staff FTE	Undergraduate FTE	Postgraduate FTE	School Staff: Student Ratio	Faculty Staff: Student Ratio
18	**237**	**68**	**17**	**15**

Figures from Senior Lecturer's Annual Report approved by Council at its meeting on 15th February 2012

2.5 Accommodation and Facilities (Physical Resources)

The School has recently moved to the new Trinity Biomedical Sciences Institute and, in the process, consolidated its research laboratories to one central location. This involved vacating 2786m^2 of space and occupying 3911m^2 of new teaching, admin and research space in the TBSI. The school space now consists of a mixture of single laboratories (mainly occupied by the larger research groups), medium size laboratories (consisting of three to four research groups) and large size laboratories (consisting of eight research groups). However, in the new building there is insufficient write-up space, a shortage of administrative offices and offices for PI/group leaders. In addition the School requires further space for computers for visualisation/modelling activities, as well as laboratory and write-up space for new lecturers. For this reason the School has requested retention of its laboratory space on the top floor of the Biotechnology Building on the main campus.

[1] *The staff FTEs include all Professors, Associate Professors, Senior Lecturers and Lecturers funded from the core HEA grant, or from self-financing courses, and all part-time and occasional staff and demonstrators, converted to an FTE, who are funded from core grant or from self-financing courses.*

3. REVIEWERS' RECOMMENDATIONS

The Reviewers make the following recommendations:

- As of mid-December, the School of Biochemistry & Immunology is the only School that has moved all of its teaching and research laboratories (except for the one laboratory in the Pearse Street Enterprise Centre) into the new Biomedical Sciences Institute. The School needs to address the usage of space within its current allotment and make a clear case for any additional space. This issue is of primary importance and needs immediate attention since it will impact on practically every other issue both in the School itself and within allied units within the Institute. The External Reviewers are not in a position to make specific suggestions but wish to alert the College to the importance of immediately addressing this issue.

- The issue of determining the space allocation in the new building is closely tied to the issue of the governance of the Institute within which the School of Biochemistry and Immunology resides. The most immediate issue is who makes decisions about space within the building. The Reviewers recommend that the College work with the unit Administrators and PIs to determine how decisions will be made, how the space will be allocated and how the technical needs of the researchers within the building will be satisfied.

- There is an urgent need to replace a Chief Technician 2 position to help administer the practical classes and supervise the teaching laboratory. The Reviewers recommend that this be done as soon as possible.

- The Reviewers report that the E-learning modules that have been assembled for the practicals are impressive and the seed money to initiate this project has been well used. They suggest that additional support will be required to extend this worthwhile project and they recommend that this additional support, as specified by those working on the project, be granted.

- The Reviewers recommend that the College and School decide on how to best increase the administrative support for the School.

- The Reviewers recommend that the College provide resources and incentives to help the faculty to prepare grant applications for EU funding.

- In relation to future funding for staff holding Ussher lectureships, the Reviewers highlight the disadvantanges encountered by these staff when wishing to apply for multi-year research grants which would run beyond their contract periods. They suggest that if their performance merits advancement, staff on these contracts should be given every chance to continue after their initial contract period is complete. They recommend that the College find a suitable solution to this problem.

- The Reviewers recommend initiating a postgraduate forum in which all the postgraduates and postdocs within the School give research presentations on a rotating basis. Experience from other institutions indicates that it may be necessary to make attendance mandatory. The Reviewers recommend that an administrator or faculty member within the School take charge of managing this forum with a schedule made out well in advance.

- In relation to improving oversight of the sophister tutorial system, the Reviewers recommend that the School consider ways to oversee how each tutor carries out the duties so that some uniformity is maintained.

- The Reviewers recommend that the School investigate ways to allow students to more fully avail of the opportunities presented by the ERASMUS programme.

- With regard to strategic planning in the School, the Reviewers point to the need to develop a 'vision' for the future of Biochemistry. They recommend two parallel directions for expansion:

1) Strengthen the research in structural biology and allied biophysical areas; 2) Create a critical mass of PIs in one chosen area such as the role of metabolism in disease. In the first category, a second person doing NMR is recommended, along with one or two membrane-protein crystallographers. It is important to build strength in this area as expertise is lost in future years through retirement. There is indeed a unique opportunity to bring together structural biologists and immunologists. In the second category, it may be necessary to hire three or more people to complement those already on staff.

- The Reviewers recommend that the College and School come to an agreement as to the anticipated expansion of the number of PIs in the School so that space within the building can be kept for this purpose.

4. PROVOST'S RECOMMENDATIONS TO COUNCIL

In light of the Review Report and the responses from the School of Biochemistry & Immunology and the Faculty Pro-Dean, it is recommended that:

1. The School of Biochemistry & Immunology working closely with the Dean of the Faculty of Engineering, Mathematics & Science, and other relevant Academic Officers, should consider the detailed recommendations of the Review Report and draw up an implementation plan[2] for Council approval.

2. The Director continue to work with the Dean of Research to bring forward a proposal for recognition of the Biosciences Institute as a Trinity Research Institute.

[2] See Procedures and Protocol for Quality Review of Schools 2011/12 at *http://www.tcd.ie/vpcao/quality/assets/pdf/Procedures_and_Protocol_for_Quality_Reviews_of_Schools_2011_12.pdf*

5. REVIEWERS' REPORT

Review of the School of Biochemistry & Immunology

12-14 Dec 2011

Reviewers: Sheena Radford, University of Leeds, UK; Jacques Piette, University of Liege, Belgium, Robert Gennis, University of Illinois, USA.

Introduction

It is appropriate to begin by stating that there are many very positive and, indeed, impressive aspects of the School of Biochemistry & Immunology. Briefly,

1) A fantastic new building into which the School just relocated. This brings together the entire group of PIs for the first time, provides a substantial upgrade in the quality of research space and facilities and will encourage contacts with researchers from other disciplines who are co-localized in the same building.

2) A world-class group of immunologists, well recognized for their research accomplishments.

3) Excellent overall productivity, both in terms of the number of publications and, particularly, the number of publications in highly ranked journals.

4) Good overall funding level from external sources, with a strong reliance on the Science Foundation Ireland. The School currently has 24 PIs who support a total of 70 postdocs and 76 PhD students.

5) Highly motivated faculty at all levels, dedicated to the research and teaching missions of the School. Many administrative tasks have been taken on by the faculty, which is clearly dedicated to make the School function smoothly.

6) Highly motivated and skilled technical support staff, working long hours beyond their contracted hours to deliver a first class service.

7) Healthy undergraduate programs in both Immunology and Biochemistry, currently with 55 final year students in the School. There is now a nicely designed, new program for undergraduates majoring in Biochemistry, centered around lecture modules with an emphasis on medical aspects of biochemistry. This should help improve the quality of undergraduates choosing the Biochemistry major.

8) An impressive start to using on-line teaching methods as part of the practical course in Biochemistry. This is essential to serve the large number of students while improving the quality of the course delivery.

9) Judging from the undergraduate, postgraduate and postdocs we interviewed, these cohorts seem generally to be very satisfied with the way they are treated and the quality of the supervision.

Problems and recommended solutions

There are some serious issues that must be addressed for the School to continue on its positive trajectory in the near future. The Immunology group, comprising about half of the PIs in the School, is cohesive and focused on a set of related research problems. There is a "critical mass" and established world-class leadership. The remaining half of the PIs in the School representing "Biochemistry" are much more disparate in their research interests and there is a critical need to align themselves in a way that would advertise their strengths. We will address this further in the last section on **strategic planning**. However, the way in which this problem is addressed will depend in large part on the way in which space and resources are allocated in the new building. This is the first of 9 issues which we wish to highlight as problems which need to be addressed.

1) **Space:** Ironically, the issue of insufficient space cropped up in nearly each interview with the External Review Committee. This was not expected since the amount of space occupied by the School has increased from 2786 m^2 to 3911 m^2. However, the design of the research space presents major problems. For example:

2)

   a. **Insufficient or sub-optimal equipment space**: Shifting from small laboratories to large, common laboratories greatly reduces the number of walls. This is an issue because biochemists have a number of research equipment which must sit on the floor, and generally these are placed against a wall. This includes refrigerators, freezers, centrifuges, and a variety of other small and large equipment. There are an insufficient number of equipment rooms to take the overflow. This leads to crowding, apparent in the tours.

   b. **Insufficient write-up space:** The number of desks and the arrangement and size of the desks that are allotted to postgraduates and postdocs are not suitable. One of the new faculty already has a member of her team without a desk. It is also important to have desks available for undergraduates working on their fourth year projects and for visitors. The External Review Committee knows the number of researchers currently present, but was not provided with an accounting of the number of desks or their locations. It was evident in walking about that there are serious shortcomings.

   c. **Wet bench space:** The External Review Committee was not provided with an account of the wet bench space assigned to either the School as a whole or to each PI. There are some immediate as well as long-range problems. One of the young faculty stated that there was insufficient space for his current group. One of the senior PIs has moved into what appears to be very cramped space for a group of over 20 researchers. There is also concern among several of the current younger PIs that any success resulting in an increase in the number of researchers would immediately lead to a need for more bench space beyond what is either assigned or readily available.

   d. **Future needs:** The School of Biochemistry & Immunology is the only academic unit which will be housed entirely in the new Institute. Hence, any space needs that will arise from the growth and success of the current PIs, as well as growth of the number of PIs due to future hires, will be strictly constrained by the space allocated to the School within the Institute. Hence, any strategic plans for the growth of the School will be limited by the available space within the Institute.

Recommendation: As of mid-December, the School of Biochemistry & Immunology is the only School that has moved all of its teaching and research laboratories (except for the one laboratory in the Pearse Street enterprise Centre) into the new building. It is essential that the space requirements, both current and taking into account future expansion, be made now before the remaining space is occupied by PIs in other units (Molecular Medicine, Pharmacy, Chemistry and Bioengineering). The School needs to address the usage of space within its current allotment and make a clear case for any additional space. This issue is of primary importance and needs immediate attention since it will impact on practically every other issue both in the School itself and within allied units within the Institute. The External Reviewers are not in a position to make specific suggestions but we wish to alert the College to the importance of immediately addressing this issue.

3) **Governance of the Institute:** The issue of determining the space allocation in the new building is closely tied to the issue of the governance of the Institute within which the School of Biochemistry and Immunology resides. The most immediate issue is who makes decisions about space within the building. The current health of the School as well as its future potential depends on recognition that the School is at the heart of the Institute insofar as this is recognized in terms of the allocation of space and resources. The issues which were made apparent to the External Reviewers were:

a. **Space allocation within the Institute:** This involves immediate decisions to meet the current needs of the School and make sure all faculty are situated such that there is sufficient laboratory as well as write-up and instrument space. Future expansion must be considered as well. These decisions impact on the question of who else is going to occupy the building. Presumably, if the School of Biochemistry & Immunology expands, it will do so at the expense of some other unit which is expecting to move into the new building in the near future. This is a zero-sum game. It is not clear who is to make these decisions or if such decisions are politically feasible. One model would be for the Director of the Institute to take overall responsibility for making the decision on who occupies the research space. Researchers from units outside Biochemistry and Immunology should occupy space in the building to the extent that their work is tied to the research mission of the Institute and that they function in a way that a good case can be made for the faculty to be housed within the Institute. It might be considered to have groups from different units located within the same large laboratory to enhance collaborations. We are not in a position to make specific recommendations concerning the Institute, but it is obvious that the many decisions made concerning the Institute and the new building will impact on the School of Biochemistry & Immunology.

b. **Technical support:** In interviewing the technical support staff, it became apparent that how the technical support for the entire Institute within the building will be satisfied has not been determined. The School staff is already present and it would be a natural tendency to simply expand their duties to include research groups which subsequently move into the new building. It is our impression that this has not been thought out in any detail. Clear governance of the Institute is required to address this and like issues. What is clear is that the technical support staff of the School of Biochemistry & Immunology is working at maximal capacity, so this should be addressed before others occupy the building.

Recommendation: The College can work with the unit Administrators and PIs to determine how decisions will be made, how the space will be allocated and how the technical needs of the researchers within the building will be satisfied. This needs to be addressed soon, before the rest of the building is occupied.

4) **Additional technical support staff:**

a. There is an urgent need to replace a Chief Technician 2 position to help administer the practical classes and supervise the teaching laboratory. We recommend that this be done as soon as possible.

b. The E-learning modules that have been assembled for the practicals are impressive and the seed money to initiate this project has been well used. Additional support will be required to extend this worthwhile project. We recommend that additional support, as specified by those working on this project, be granted.

5) **Increased administrative support:** It seems that both the College and School administrators are aware of the need for additional help to administer the business of the School. The faculty has taken on administrative burdens that in most other places are handled by administrators with proper experience. Support is needed for such tasks as preparing budgets for research grants, timetabling, gathering and assembling information for putting together large research proposals, preparing data to be sent to the College, etc. We recommend that the College and School decide on how to best increase the administrative support for the School.

6) **Diversify funding sources:** The major external source of funding for research in the School is the SFI. It is recognized that the research prowess of the faculty in the School is admirable and the funding brought into TCD is considerable. It would be wise to take advantage of other sources of research support, particularly in these times when the Irish economy is doing poorly. The School has many researchers who should be highly competitive for EU funding

(FP7 and ERC grants). We recommend that the College provide resources and incentives to help the faculty to prepare grant applications for EU funding.

7) **Improve the lot of Ussher lectureships:** These lectureships have admirably allowed the College to bring in young faculty at a time when the local funding shortages have been severe. The School has been particularly competitive to win these lectureships with strong candidates. However, at this point the individuals with these lectureships are very uncertain about their future options. Their position is particularly disadvantageous because it appears that since their contracts are not guaranteed after 5 years, they will not be able to compete for multi-year research grants after their second year on the staff. This is a "career killer" and an unintended consequence that needs to be avoided. We were very favorably impressed with the individuals who currently hold these lectureships within the School. They are very hard working and dedicated and should be given every chance to continue after 5 years if their performance merits advancement. We recommend that the College find a suitable solution to this problem.

8) **Initiate a postgraduate forum:** The new building brings together research groups that were previously dispersed for the purpose to inspire collaborative, interdisciplinary research. This will benefit from initiating a postgraduate forum in which all the postgraduates and postdocs within the School give research presentations on a rotating basis. It would be very reasonable to include researchers from other units within the new building. In this way, students and others can learn what else is going on within the Institute and within the School. Furthermore, it provides good training for the postgraduates to learn the art of public speaking and presenting their work to a more general audience. We recommend that an administrator or faculty member within the School take charge of managing this forum with a schedule made out well in advance, perhaps two 30-minute presentations each week. Experience from other institutions indicates that it may be necessary to make attendance mandatory.

9) **Improve oversight of the sophister tutorial system:** Our interviews with undergraduate students indicated a wide range of experiences in their tutorial. All appreciated the system, and this was certainly enhanced by having tutors who put significant time and thought into the tutorial sessions. However, there was a great diversity in the student experience and workload in these sessions. We recommend that the School consider ways to oversee how each tutor carries out the duties so that some uniformity is maintained.

10) **Increase participation in ERASMUS:** The undergraduates would benefit from participating in ERASMUS, which currently is very much underutilized. It is important generally to increase ties to European research labs and this provides a mechanism that is beneficial for all involved. One issue seems to be that the applications are due prior to the commitment of being accepted into the Biochemistry major. It is not clear if this really prohibits participation. We recommend that the School investigate ways to allow students to avail themselves of ERASMUS.

Strategic Planning

The School is well positioned to play a central role in the development of the biological sciences at TCD in the future. About half of the PIs have research programs in the area of Immunology and there is considerable synergy within this group. The remaining PIs who consider themselves in the "Biochemistry" or non-Immunology part of the School are considerably less focused as a group. This is more of a reflection of the breadth of what is considered to be Biochemistry than a failure on the part of the School. Nevertheless, the question remains how to enhance the reputation and visibility as a group for the non-Immunologists within the School. The need to do this, to develop a "vision" for the future of Biochemistry at TCD is recognized by the PIs themselves. There is no single right answer, and any answer will require TCD to provide resources. In essence, this comes down to how to hire future PIs in the School.

It is evident that the position of the School within the new Institute and TCD makes it natural to emphasize medical biochemistry. Broadly speaking, many of the PIs can already self-identify with this, or at least have collaborative projects that can fit this description. The immediate plan is to make the next lecturer-hire in the area of "metabolism", and to seek funding for a Chair in "Metabolism &

Human Disease, which is very sensible. However, it is recognized that this can be very broadly defined, which puts off hard decisions until the applicants are identified.

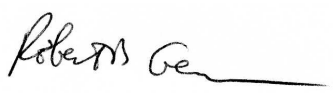
The challenge is how to have a unit with approximately 12 PIs who can cover fundamental research areas and techniques—e.g., structural biology, enzymology, spectroscopy, mass spectrometry—and still have a critical mass in one or two research areas (as, for example, Immunology). Given the role of the School within TCD (and Ireland, more generally), shoring up these "fundamentals" is particularly important.

We recommend two parallel directions for expansion: 1) Strengthen the research in structural biology and allied biophysical areas; 2) Create a critical mass of PIs in one chosen area such as the role of metabolism in disease. In the first category, a second person doing NMR is recommended, along with one or two membrane-protein crystallographers. It is important to build strength in this area as expertise is lost in future years through retirement. There is indeed a unique opportunity to bring together structural biologists and immunologists. In the second category, it may be necessary to hire three or more people to complement those already on staff.

We also recommend that the College and School come to an agreement as to the anticipated expansion of the number of PIs in the School so that space within the building can be kept for this purpose. Obviously, no new PIs can be hired if there is no research space available within the building. We recognize that there are financial considerations, but suggest that this represents hiring to build up the unit that is the most central to the future of biomedical research at TCD.

February 1, 2012

Robert B. Gennis, Urbana, IL USA



6. SCHOOL'S RESPONSE TO THE REVIEW REPORT FOR BIOCHEMISTRY & IMMUNOLOGY

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7) Healthy undergraduate programs in both Immunology and Biochemistry, currently with 55 final year students in the School. There is now a nicely designed, new program for undergraduates majoring in Biochemistry, centered around lecture modules with an emphasis on medical aspects of biochemistry. This should help improve the quality of undergraduates choosing the Biochemistry major.

8) An impressive start to using on-line teaching methods as part of the practical course in Biochemistry. This is essential to serve the large number of students while improving the quality of the course delivery.

9) Judging from the undergraduate, postgraduate and postdocs we interviewed, these cohorts seem generally to be very satisfied with the way they are treated and the quality of the supervision.

SCHOOL RESPONSE: We thank the reviewers for these positive comments. The School of B&I recognizes that the high quality of teaching and research output over many years in sub-standard facilities has been a central reason for Trinity and the HEA through PRTLI to invest in a new facility in Pearse Street to house all of the school's educators and researchers. During the previous 10 years, the School of B&I has been extremely successful in attracting major national, international and industry research funding and at the same time doubling its student number. We are very fortunate to have a core group of highly motivated and skilled technical and support staff that have taken on many extra jobs during the School expansion. We appreciate the reviewers' recognition of this essential component to our success. Approximately 18% of all Trinity students take intensive practical courses in the B&I teaching laboratory and we agree with the reviewers on the need for on-line teaching and learning methods. The School considers this an important aspect for ensuring top-quality students to emerge from Trinity and has put considerable investment into developing such teaching services.

Problems and recommended solutions
There are some serious issues that must be addressed for the School to continue on its positive trajectory in the near future. The Immunology group, comprising about half of the PIs in the School, is cohesive and focused on a set of related research problems. There is a "critical mass" and established world-class leadership. The remaining half of the PIs in the School representing "Biochemistry" are much more disparate in their research interests and there is a critical need to align themselves in a way that would advertise their strengths. We will address this further in the last section on **strategic planning**. However, the way in which this problem is addressed will depend in large part on the way in which space and resources are allocated in the new building. This is the first of 9 issues which we wish to highlight as problems which need to be addressed.

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    a. **Insufficient or sub-optimal equipment space**: Shifting from small laboratories to large, common laboratories greatly reduces the number of walls. This is an issue because biochemists have a number of research equipment which must sit on the floor, and generally these are placed against a wall. This includes refrigerators, freezers, centrifuges, and a variety of other small and large equipment. There are an insufficient number of equipment rooms to take the overflow. This leads to crowding, apparent in the tours.

    b. **Insufficient write-up space:** The number of desks and the arrangement and size of the desks that are allotted to postgraduates and postdocs are not suitable. One of the new faculty already has a member of her team without a desk. It is also important to have desks available for undergraduates working on their fourth year projects and for visitors. The External Review Committee knows the number of researchers currently present, but was not provided with an accounting of the number of desks or their locations. It was evident in walking about that there are serious shortcomings.

    c. **Wet bench space:** The External Review Committee was not provided with an account of the wet bench space assigned to either the School as a whole or to each PI. There are some immediate as well as long-range problems. One of the young faculty stated that there was insufficient space for his current group. One of the senior PIs has moved into what appears to be very cramped space for a group of over 20 researchers. There is also concern among several of the current younger PIs that any success resulting in an increase in the number of researchers would immediately lead to a need for more bench space beyond what is either assigned or readily available.

    d. **Future needs:** The School of Biochemistry & Immunology is the only academic unit which will be housed entirely in the new Institute. Hence, any space needs that will arise from the growth and success of the current PIs, as well as growth of the number of PIs due to future hires, will be strictly constrained by the space allocated to the School within the Institute. Hence, any strategic plans for the growth of the School will be limited by the available space within the Institute.

Recommendation: As of mid-December, the School of Biochemistry & Immunology is the only School that has moved all of its teaching and research laboratories (except for the one laboratory in the Pearse Street Enterprise Centre) into the new building. It is essential that the space requirements, both current and taking into account future expansion, be made now before the remaining space is occupied by PIs in other units (Molecular Medicine, Pharmacy, Chemistry and Bioengineering). The School needs to address the usage of space within its current allotment and make a clear case for any additional space. This issue is of primary importance and needs immediate attention since it will impact on practically every other issue both in the School itself and within allied units within the Institute. The External Reviewers are not in a position to make specific suggestions but we wish to alert the College to the importance of immediately addressing this issue.

SCHOOL RESPONSE: The school acknowledges that lack of space is a serious impediment to its research and teaching activities, which are currently compromised. In addition to the reviewers comments above, extra demand on space has arisen because:

(i) the School has incorporated 550m^2 of previous laboratory space in the Pearse Street Enterprise centre for one of the its research groups into the TBSI.

(ii) the teaching laboratory has also doubled its size to account for the big increase in student numbers. 18 % of the total number of Trinity undergraduate students (Science, Medicine, Pharmacy, Therapeutic Radiographers) now complete practical courses in this laboratory.

(iii) a 30% increase in the number (56) of Senior Sophister students who spend 4 months in the laboratories undertaking research projects, during the previous 5 years.

(iv) a 50% increase in the number (83) of PhD students doing fulltime research projects in the School research laboratories, during the previous 5 years.

(v) the School has allocated space to core TBSI facilities such as the NMR suite and the Category III facility.

The school space now consists of a mixture of single laboratories (mainly occupied by the larger research groups), medium size laboratories (consisting of 3 to 4 research groups) and large size laboratories (consisting of multiple research groups). During the planning stages of the TBSI (approximately 5 years ago) the School had 21 active research groups; since the move to TBSI (and accounting for retirements and new hires) there are now 26 active research groups and 2 new research lecturers scheduled to start in early 2012. This constitutes an increase of 25% in research active groups at the time of the move to TBSI and leaves no room for the originally designed 20% expansion plan.

As a result of this surge in School research and teaching activities there is insufficient laboratory space, insufficient write-up space, a shortage of administrative offices and offices for PI/group leaders. Some lecturers have to share offices, which is not ideal for student tutorials. The School has over 110 fulltime researchers on its books that accounts for one of the largest concentration of active researchers in a single location on campus. In addition the School requires further space for computers for visualisation/modelling activities, as well as laboratory and write-up space for new lecturers who will be arriving mid-2012.

The School of B&I is the only school to have fully relocated into the TBSI and at present has no facility for maintaining overflow of researchers in any other location. For these reasons and having already surpassed space capacity upon arrival in the TBSI, the School has requested from the College Space Allocation Committee an additional 5 office spaces, 200m^2 laboratory space and 100m^2 equipment room space for immediate use by researchers. A 200m^2 laboratory space (currently an empty room with no lab fittings) exists at Level -2 in the TBSI. The School requests that this area be developed as a laboratory, cell culture room and office space to alleviate some of the School needs for extra space. For expansion space over the next 2 years, the School is currently targeting 2 high profile international researchers in the areas of Immunology and Metabolism & Human Disease to apply for ERC grants and relocate to Trinity. Therefore, we will require an additional 2 x 100m^2 labs, 2 x 10m^2 offices and 4 x 15m^2 equipment rooms. The School requests that the College Space Allocation Committee consider how best to solve these needs.

1) **Governance of the Institute:** The issue of determining the space allocation in the new building is closely tied to the issue of the governance of the Institute within which the School of Biochemistry and Immunology resides. The most immediate issue is who makes decisions about space within the building. The current health of the School as well as its future potential depends on recognition that the School is at the heart of the Institute insofar as this

is recognized in terms of the allocation of space and resources. The issues which were made apparent to the External Reviewers were

a. **Space allocation within the Institute:** This involves immediate decisions to meet the current needs of the School and make sure all faculty are situated such that there is sufficient laboratory as well as write-up and instrument space. Future expansion must be considered as well. These decisions impact on the question of who else is going to occupy the building. Presumably, if the School of Biochemistry & Immunology expands, it will do so at the expense of some other unit which is expecting to move into the new building in the near future. This is a zero-sum game. It is not clear who is to make these decisions or if such decisions are politically feasible. One model would be for the Director of the Institute to take overall responsibility for making the decision on who occupies the research space. Researchers from units outside Biochemistry and Immunology should occupy space in the building to the extent that their work is tied to the research mission of the Institute and that they function in a way that a good case can be made for the faculty to be housed within the Institute. It might be considered to have groups from different units located within the same large laboratory to enhance collaborations. We are not in a position to make specific recommendations concerning the Institute, but it is obvious that the many decisions made concerning the Institute and the new building will impact on the School of Biochemistry & Immunology.

SCHOOL RESPONSE: The School agrees with the reviewer's comments concerning a requirement for an appropriate decision-making process in the institute. The School of Biochemistry & Immunology is in a different situation to other schools in that it has fully relocated all of its research and core teaching activities to the new institute. As a result it does not have any other space to act as an 'overflow' space for existing and expanding research laboratories.

b. **Technical support:** In interviewing the technical support staff, it became apparent that how the technical support for the entire Institute within the building will be satisfied has not been determined. The School staff is already present and it would be a natural tendency to simply expand their duties to include research groups which subsequently move into the new building. It is our impression that this has not been thought out in any detail. Clear governance of the Institute is required to address this and like issues. What is clear is that the technical support staff of the School of Biochemistry & Immunology is working at maximal capacity, so this should be addressed before others occupy the building.

SCHOOL RESPONSE: The school agrees with this synopsis. Initially an attempt was made by the respective schools to establish a shared services group to maximize operations in the institute. In the absence of sufficient contribution to these shared services, the School of B&I has provided 2 storesmen to shared services and 2 workshop technicians have helped established critical services such as centrifugation and autoclave facilities. The school provisionally signed up to shared services on a 6 month trial basis, however, as other institute schools move in to their respective research laboratories, it is clear that the skeleton shared service team will be unable to function appropriately. When this occurs, we will withdraw our members of the shared services team to attend to school matters only. The reviewers correctly point out that our technical staff is working at maximal capacity, which is clearly unsustainable as other schools will have moved to the TBSI by April 2012. Unless College increases support to the Institute Shared Services team, all teaching and research activities will continue to be seriously affected and successful attainment of the PRTLI objectives will be compromised.

Recommendation: The College can work with the unit Administrators and PIs to determine how decisions will be made, how the space will be allocated and how the technical needs of the researchers within the building will be satisfied. This needs to be addressed soon, before the rest of the building is occupied.

SCHOOL RESPONSE: In the absence of a TBSI board, this is a matter for the college Space Allocation Committee. In the long term it is envisaged that the TBSI board will consider space requests in the institute.

3) Additional technical support staff:

a. There is an urgent need for a Chief Technician 2 position to help administer the practical classes and supervise the teaching laboratory. We recommend that this be done as soon as possible.

b. The E-learning modules that have been assembled for the practicals are impressive and the seed money to initiate this project has been well used. Additional support will be required to extend this worthwhile project. We recommend that additional support, as specified by those working on this project, be granted.

SCHOOL RESPONSE: The school is committed to seeking a replacement Chief Tech 2 and will formulate a case for sanction by the Faculty. The School supports the recommendation concerning e-learning and has already raised considerable funds to initiate these modules. In response to the large numbers of undergraduates who take practical courses in the teaching laboratory the school has piloted a series of e-learning modules for students. Considerable time has been invested in formulating online interactive exercises based on student prior knowledge, activities to be performed during practicals, practice examinations and examinations that test what the student has learnt during real practicals. In addition, the school has, in collaboration with the Trinity Audiovisual Centre, produced short 10 minute videos of basic tasks to be performed in the practicals and these videos are online and accessible as podcasts and short movies. This has been extremely successful in terms of student interaction prior to practicals, during practicals and following practicals, The school is committed to expanding these facilities for all practicals and for all student classes that take practical courses in the main teaching laboratory.

4) Increased administrative support: It seems that both the College and School administrators are aware of the need for additional help to administer the business of the School. The faculty has taken on administrative burdens that in most other places are handled by administrators with proper experience. Support is needed for such tasks as preparing budgets for research grants, timetabling, gathering and assembling information for putting together large research proposals, preparing data to be sent to the College, etc. We recommend that the College and School decide on how to best increase the administrative support for the School.

SCHOOL RESPONSE: The school has requested school administrative support and FEMS has sanctioned a hiring of a school administrator who will perform key tasks as described by college policy for school administrators. The position is currently advertised and interviews will be held shortly.

5) Diversify funding sources: The major external source of funding for research in the School is the SFI. It is recognized that the research prowess of the faculty in the School is admirable and the funding brought into TCD is considerable. It would be wise to take advantage of other sources of research support, particularly in these times when the Irish economy is doing poorly. The School has many researchers who should be highly competitive for EU funding (FP7 and ERC grants). We recommend that the College provide resources and incentives to help the faculty to prepare grant applications for EU funding.

SCHOOL RESPONSE: The school has recently submitted a number of FP7 funding proposals in the area of Marie Curie Initial Training Networks as well as individual fellowships. 2 further Marie Curie ITN applications in the area of cancer metabolism and immunology are planned for 2013. One senior PI has recently submitted an ERC proposal and it is expected that 2 further senior ERC PI proposals and 1 ERC Synergy proposal will be submitted in 2013. 1 NIH proposal was recently funded and 1 recently submitted for review. The school is extremely active in academia-industry research partnerships and seeks to increase this activity in the next 3 years. The school of B&I leads college in terms of research funds raised per PI (approximately 500K per PI per year), and seeks to increase this amount through further

applications to the Wellcome Trust, National Institutes of Health, Human Frontiers Science Programme, and a range of FP7 and Horizon programmes. In order achieve these objectives the school requests a grants officer to target new funding possibilities and help coordinate research proposal documents.

6) **Improve the lot of Ussher lectureships:** These lectureships have admirably allowed the College to bring in young faculty at a time when the local funding shortages have been severe. The School has been particularly competitive to win these lectureships with strong candidates. However, at this point the individuals with these lectureships are very uncertain about their future options. Their position is particularly disadvantageous because it appears that since their contracts are not guaranteed after 5 years, they will not be able to compete for multi-year research grants after their second year on the staff. This is a "career killer" and an unintended consequence that needs to be avoided. We were very favorably impressed with the individuals who currently hold these lectureships within the School. They are very hard working and dedicated and should be given every chance to continue after 5 years if their performance merits advancement. We recommend that the College find a suitable solution to this problem.

SCHOOL RESPONSE: The school recognizes the excellence of its Ussher & other junior lecturers that were recently appointed, some as joint lecturers with other schools. As the reviewers correctly highlight, it is essential that these lecturers continue to perform at a high level and that they are given the opportunity to receive permanent contracts with Trinity. The school is very conscious of the retention priority and of other institutions (especially in the UK) seeking to hire young and dynamic researchers and fully agrees with the reviewers that these lecturers require mainstreaming, preferably by end of year 3 of their current contracts.

7) **Initiate a postgraduate forum:** The new building brings together research groups that were previously dispersed for the purpose to inspire collaborative, interdisciplinary research. This will benefit from initiating a postgraduate forum in which all the postgraduates and postdocs within the School give research presentations on a rotating basis. It would be very reasonable to include researchers from other units within the new building. In this way, students and others can learn what else is going on within the Institute and within the School. Furthermore, it provides good training for the postgraduates to learn the art of public speaking and presenting their work to a more general audience. We recommend that an administrator or faculty member within the School take charge of managing this forum with a schedule made out well in advance, perhaps two 30-minute presentations each week. Experience from other institutions indicates that it may be necessary to make attendance mandatory.

SCHOOL RESPONSE: The school has run postgraduate forums on a number of occasions, however, poor attendance was responsible for their termination. The school agrees with the reviewers to make attendance mandatory and has now initiated this system.

8) **Improve oversight of the sophister tutorial system:** Our interviews with undergraduate students indicated a wide range of experiences in their tutorial. All appreciated the system, and this was certainly enhanced by having tutors who put significant time and thought into the tutorial sessions. However, there was a great diversity in the student experience and workload in these sessions. We recommend that the School consider ways to oversee how each tutor carries out the duties so that some uniformity is maintained.

SCHOOL RESPONSE: The school recognizes this problem and in recent years has established a core tutorial curriculum that all tutors are required to operate. The school will work to ensure that students receive equal amounts of information while allowing for all students to improve their level of intellectual ability, as well as allowing for tutors to operate their own style of teaching and engagement with students.

9) **Increase participation in ERASMUS:** The undergraduates would benefit from participating in ERASMUS, which currently is very much underutilized. It is important generally to increase ties to European research labs and this provides a mechanism that is beneficial for all involved. One issue seems to be that the applications are due prior to the commitment of being accepted into the Biochemistry major. It is not clear if this really prohibits participation. We recommend that the School investigate ways allow students to avail themselves of ERASMUS.

SCHOOL RESPONSE: The School has fully engaged with the Erasmus scheme since its establishment, and continues to receive many international students, some at the undergraduate level but most at the postgraduate level. It will seek to increase the numbers of incoming and outgoing undergraduate Erasmus students. However, it is our experience that the numbers of incoming students are always higher that outgoing, due to the popularity of Trinity with international students.

Strategic Planning
The School is well positioned to play a central role in the development of the biological sciences at TCD in the future. About half of the PIs have research programs in the area of Immunology and there is considerable synergy within this group. The remaining PIs who consider themselves in the "Biochemistry" or non-Immunology part of the School are considerably less focused as a group. This is more of a reflection of the breadth of what is considered to be Biochemistry than a failure on the part of the School. Nevertheless, the question remains how to enhance the reputation and visibility as a group for the non- Immunologists within the School. The need to do this, to develop a "vision" for the future of Biochemistry at TCD is recognized by the PIs themselves. There is no single right answer, and any answer will require TCD to provide resources. In essence, this comes down to how to hire future PIs in the School.

It is evident that the position of the School within the new Institute and TCD makes it natural to emphasize medical biochemistry. Broadly speaking, many of the PIs can already self- identify with this, or at least have collaborative projects that can fit this description. The immediate plan is to make the next lecturer-hire in the area of "metabolism" and to seek funding for a Chair in 'Metabolism & Human Disease', which is very sensible. However, it is recognized that this can be very broadly defined, which puts off hard decisions until the applicants are identified. The challenge is how to have a unit with approximately 12 PIs who can cover fundamental research areas and techniques—e.g., structural biology, enzymology, spectroscopy, mass spectrometry—and still have a critical mass in one or two research areas (as, for example, Immunology). Given the role of the School within TCD (and Ireland, more generally), shoring up these "fundamentals" is particularly important.

We recommend two parallel directions for expansion: 1) Strengthen the research in structural biology and allied biophysical areas; 2) Create a critical mass of PIs in one chosen area such as the role of metabolism in disease. In the first category, a second person doing NMR is recommended, along with one or two membrane-protein crystallographers. It is important to build strength in this area as expertise is lost in future years through retirement. There is indeed a unique opportunity to bring together structural biologists and immunologists. In the second category, it may be necessary to hire three or more people to complement those already on staff.

We also recommend that the College and School come to an agreement as to the anticipated expansion of the number of PIs in the School so that space within the building can be kept for this purpose. Obviously, no new PIs can be hired if there is no research space available within the building. We recognize that there are financial considerations, but suggest that this represents hiring to build up the unit that is the most central to the future of biomedical research at TCD.

SCHOOL RESPONSE: Prior to Trinity restructuring, the Department of Biochemistry was located in the Wellcome and Biotechnology buildings on the main campus. During the restructuring process the department morphed into the School of Biochemistry and Immunology to reflect our emerging strength in the area of immunology. Since the restructuring process, the school has maintained and strengthened its position as Ireland's leading centre for biochemistry teaching and research, as well as building a world-renowned centre for immunology research. Many of the schools leading researchers were trained in biochemistry in Trinity and have gone on to be leaders in their respective research areas. The school is predominantly occupied with biochemists who work in the areas of immunology, neuroscience, cancer, metabolism, structural biology and cell biology. Central to the school's success has been the underlying focus on discovery of fundamental biochemical mechanisms and identification of biomolecule structure and function in relation to human disease. It is within this context that the school recognizes biochemistry as the core discipline that is fundamental to all its teaching and research activities.

The school agrees with the reviewers that there is a need to strengthen biochemistry in other research areas to compliment its undoubted success in immunology. Therefore, it has identified two areas where synergy is evident; metabolism and structural biology. A new lecturer in the area of metabolism and enzymology will be recruited shortly and the school will work towards strengthening research in the NMR area, if possible in relation to immunological structure and function. In addition, the School seeks to hire a Chair in Metabolism & Human Disease and also a Chair in Immunology.

In conclusion, the school recognizes that its current space is limited and will continue to seek expansion space, either in the TBSI or elsewhere on the main campus. The School of Biochemistry and Immunology willingly moved to TBSI since the School was split across multiple sites in very sub-standard facilities. Although TBSI is a clear step up for the School, serious problems have emerged which threaten both research and teaching. As identified by the external assessors, the space allocated is clearly insufficient. We need as a matter of extreme urgency to have this resolved, since if the present situation continues, the School will be severely compromised in terms of research activities and also teaching. The school is ideally placed to win funding for a large scale SFI centre (up to €25 million), however, in the absence of sufficient research space a competitive application will not be possible. There are also operational issues in TBSI which need to be resolved and we are working with the Director in the presentation of a case for support from College to establish TBSI as a properly resourced Institute. A major concern here is the establishment of Shared Services. The College must support the Director's application for appropriate staffing of Shared Services as otherwise we will be forced to retrench our staff currently assigned, which would be extremely negative for TBSI.

Prof. Gavin Davey
Head of School

5th March 2012

7. PRO-DEAN'S RESPONSE TO THE REVIEW REPORT FOR BIOCHEMISTRY & IMMUNOLOGY

The Pro-Dean welcomes the report of the reviewers, which highlights many impressive aspects of the School of Biochemistry & Immunology. The key strengths identified include:

- The quality of the research space and facilities in the Trinity Biomedical Sciences Institute;
- The excellent research outputs & funding and world-class researchers, particularly in Immunology;
- Highly dedicated and skilled staff, both academic and technical;
- Strong undergraduate programmes in both Biochemistry and Immunology, with good use of on-line teaching and good quality research supervision.

The Pro-Dean notes and supports the recommendations of the reviewers, in particular their key recommendations that:

- The allocation of space within the Trinity Biomedical Sciences Institute should be reviewed to determine whether there is scope for providing additional and/or more suitable space for the School of Biochemistry & Immunology;
- The governance of the Institute should be clarified, both in relation to the decision making around space allocation and with regard to determining the technical support arrangements for the Institute;
- College should work with the School to find a way to increase the technical and administrative supports available for the School;
- The School should be supported in its strategic planning towards a coherent research theme within Biochemistry, perhaps in the area of metabolism, while still maintaining a breadth of expertise across the discipline.

In relation to the reviewers' first recommendation, the scope for revisiting the Biosciences space allocation may be somewhat constrained by the conditions of the PRTLI funding and by the requirement to provide commercial laboratory space. Nonetheless, the situation of Biochemistry & Immunology is unique in that the School will not maintain a base elsewhere in College. On that basis, the issue of providing adequate space for the School within the Biosciences Institute should be addressed.

It is important that College learns from its experience in relation to governance and space allocation within the Trinity Biomedical Sciences Institute so that future integrated building projects are managed effectively from the earliest stage of planning.

Overall, the School of Biochemistry & Immunology should welcome this review report, which rightly identifies its many strengths and achievements.

Prof. Darina Murray,
Pro-Dean of Faculty,
Engineering, Mathematics & Science.
26th January, 2012.