



RCSI

IMPROVING HUMAN HEALTH RCSI'S STRATEGY FOR EXCELLENCE IN TRANSLATIONAL RESEARCH 2014 - 2020

RCSI DEVELOPING HEALTHCARE LEADERS WHO MAKE A DIFFERENCE WORLDWIDE

CONTENTS

Foreword	4
1. Research at RCSI - the institutional context, mission and objectives	7
2. Build capacity in translational research	11
2.1 Strengthening institutional links with clinical organisations	11
2.2 Promoting and facilitating the engagement of clinicians in translational research and training initiatives	12
2.3 Building capacity in multidisciplinary biomedical research	12
3. Promote applied research and knowledge transfer	15
3.1 Rationale (including alignment with institutional and national strategies, and EU policies)	15
3.2 Action plan for the promotion of engagement with industry	18
3.3 Expected impact	19
4. Promote population health and health services research	21
4.1 The research vision	21
4.2 The research plan	22
4.3 Expected impact	23
5. Strengthen the intersection of research and education	25
5.1 Training for postgraduate students	25
5.2 Training in population health and health services research	28
5.3 Training for undergraduate students	30
5.4 New development – Health Professions Education Research	31
5.5 Research in surgical training	34
6. Develop human resources strategy for researchers	37
7. Enhance research governance and management structure	38
8. Deliver and disseminate impactful research	41
9. Annexes	44
1 – RCSI strategic partnerships	44
2 – Process for establishment of research centres	46
3 – RCSI support strategy for Horizon 2020 and other funding programmes	47
4 – Examples of ongoing outreach initiatives	48
5 – Glossary of acronyms and abbreviations	50



FOREWORD FROM THE CHIEF EXECUTIVE

The plans for developing research and innovation at RCSI are based on RCSI's current strategic roadmap 2013 – 2017 'Growth & Excellence' and are in alignment with national and European research funding strategies.

This 'Excellence in Translational Research 2014 – 2020' document outlines our goals for research and innovation at RCSI and outlines the activities that will ensure the fulfilment of the College's research vision - to improve human health through

Prof. Cathal Kelly,
Chief Executive/Registrar

translational research, which is informed by bedside problems, societal and global health challenges.

As an exclusively health sciences focused educational and research institution with strong links to acute hospitals and other institutions that reflect the wide diversity of healthcare facilities and needs, RCSI is uniquely placed to develop and enhance translational research for the benefit of patients and the healthcare system.



FOREWORD FROM THE DIRECTOR OF RESEARCH

The mission of the RCSI Institute of Research is to improve human health by promoting innovative research that leads to better diagnostics, therapeutics and devices, tackles important healthcare delivery issues, informs policy and clinical practice and enhances the quality of education of healthcare professionals. I am very pleased to launch the College's six year strategy for research and

Prof. Raymond Stallings,
Director of Research

innovation that will enable RCSI to gain success in its mission. I am also delighted to simultaneously launch the newly formed Office of Research and Innovation that will provide an integrated service to researchers ranging from translational biomedical research to the commercialisation of that research for the benefit of society.

1. RESEARCH AT RCSI – THE INSTITUTIONAL CONTEXT, MISSION AND OBJECTIVES

The Royal College of Surgeons in Ireland (RCSI) is an independent, self-financing, not-for-profit health sciences institution with headquarters in Dublin (Ireland) and a global reach through its overseas medical universities in the Middle and Far East. Since its foundation in 1784, it has played a leadership role in both research and in Irish surgical and medical education. Currently, it operates the largest medical school in Ireland and provides undergraduate education in Physiotherapy and Pharmacy. In addition to Surgery, it also provides postgraduate training and education in Radiology, Dentistry, Nursing and Midwifery, Sports and Exercise Medicine, Healthcare Management & Leadership, and Biomedical Sciences.

RCSI recognises that excellence in research is critical to the quality of its educational activities, its credibility and its mission to enhance human health. The profile of RCSI research started to grow and become prominent in the year 2000, both nationally and internationally, by becoming the lead institute in four inter-institutional PRTL (Programme for Research in Third Level Institutions) funded programmes with total funding of €86m. In 2005, it launched RCSI's Research Institute, a multi-site biomedical research facility (total area, 5,800sq m) comprising research laboratories and core research infrastructures across the St Stephen's Green campus and the Education Research Centre (ERC) at Beaumont Hospital. The ERC also houses RCSI's Clinical Research Centre (CRC), the first clinical research facility in Ireland. To promote research and seed fund

clinician-scientist collaborations, between 2004 and 2013, RCSI invested €59m of its own non-exchequer funding in research infrastructures, human resources and research projects. Very importantly, it has been able to attract and retain world-class researchers through joint funding support from RCSI, Science Foundation Ireland (SFI: Professors, Stokes Chair, Walton Award, President of Ireland Young Researcher Award, Principal Investigator Awards), Health Research Board (HRB Clinician Scientist Awards and Translational Research Awards, co-funded with SFI) and the European Research Council (ERC) for the highly prestigious Investigator grant. RCSI continues to play a leadership role in large national and international collaborative programmes (Annex 1). The combination of these developments and successes has enabled the continuous enhancement of RCSI's research infrastructures and led to the expansion of RCSI's research community, which, as of January 2014, includes:

Principal investigators (PIs)	= 106
Postdoctoral researchers	= 104
Research support staff	= 85
PhD students registered in 2013	= 115
Total number of active researchers	= 410

The mission of RCSI's research strategy is to improve human health through translational research: clinical, laboratory-based and health service research informed by bedside problems, and societal and global health challenges. We promote innovative research that leads to improved diagnostics, therapeutics and devices; tackles important healthcare

Building on our historic roots in surgical training and research, the modern RCSI is a leading Irish centre for innovative research in health sciences

delivery issues; informs policy and clinical practice and enhances the quality of education of healthcare professionals.

As an exclusively health sciences-focused educational and research institution with strong links to acute hospitals and other institutions that reflect the wide diversity of healthcare facilities and needs, locally and nationally, RCSI is uniquely placed to develop and enhance translational research for the benefit of patients and to improve the health of the community. Importantly, RCSI academic staff, who have joint appointments with hospitals, bring to RCSI clinical expertise and resources that are essential to deliver truly translational research, from bench to bedside to population and vice-versa. In the last decade, RCSI's translational research strategy has focused primarily on regenerative medicine, cancer, respiratory diseases, neurodegenerative

and psychiatric disorders, cardiovascular, inflammatory and infectious diseases. The strategy has also promoted collaborative research in population health and health services that could be translated into benefits to patients and the community.

Since basic biomedical research informed by bedside problems is at the foundation of translational biomedical research, one of the main objectives of RCSI research strategy has been the promotion of collaborations between basic scientists and clinicians. Since 2010, however, there has been a shift of focus in the national research strategy towards more applied research and health services research.

The 2010-2014 HRB strategy, for example, shifted the focus of its support from basic biomedical research to population health and health services research, or research that is more clinical in nature.

RESEARCH STRATEGY 2014 - 2020 AIMS & OBJECTIVES

In alignment with RCSI's strategic roadmap 2013-2017 and current national research funding strategies, RCSI's strategic research plan 2014-2020 is aimed at bringing RCSI research closer to applications for the benefit of patients, the healthcare system and populations.

To achieve this, RCSI has set a number of strategic objectives:

- To strengthen institutional links with clinical organisations.
- To promote the engagement of clinicians in collaborative translational research and training initiatives.
- To build capacity in multidisciplinary biomedical research.
- To place increased focus on applied research and knowledge transfer.
- To strengthen existing, and develop new, collaborative links with industry.
- To strengthen health systems and population health research and further embed its role as a national policy and practice source of evidence and expertise.
- To deliver enhanced research training and career development opportunities for researchers that are aligned to the research strategy and RCSI's strategic roadmap 2013-2017.
- To promote and support research that enhances the quality of RCSI's health science and surgical education.
- To introduce an enhanced research support and management structure that can deliver the strategic plan with a coherent and effective approach.
- To deliver and disseminate impactful research.



2. BUILD CAPACITY IN TRANSLATIONAL RESEARCH

2.1 STRENGTHENING INSTITUTIONAL LINKS WITH CLINICAL ORGANISATIONS

In 2013, the Irish Government announced a major re-structuring of public hospitals into regions with a view to enhancing the delivery of health services. Six hospital groups were appointed, each with its own affiliated academic medical school partner. The newly formed hospital group affiliated with RCSI is called RCSI Hospitals and includes Beaumont Hospital, Connolly Hospital, Our Lady of Lourdes Hospital (Drogheda), Louth County Hospital (Dundalk), Rotunda Hospital and Cavan/Monaghan General Hospital.

As envisaged by the Government and actioned by the HRB-funding strategy, RCSI will fully engage with the new hospital group to ensure that research is a key priority and is incorporated within the group's strategic aims and objectives. The initial research focus within RCSI Hospitals will be, by necessity, in the area of health services, in order to provide evidence-based best practice for realising the Government mandate for improving health care delivery. Through RCSI research and training programmes, clinical research support and infrastructures, the new context of the RCSI Hospitals will offer greater collaborative research opportunities and broaden the portfolio of clinical research expertise that will be able to attract funding support from the public and the private sectors. In order to increase the involvement of clinicians in translational research programmes, RCSI will also continue to engage with RCSI Hospitals'

management to facilitate the sharing of research expertise and resources (support and infrastructures). While we make sure that research in the clinical setting meets the clinical requirements, we will work with the RCSI Hospitals to identify the gaps that can be filled by research to deliver better healthcare.

RCSI is also a member of Molecular Medicine Ireland (MMI). Within it, RCSI's Clinical Research Centre (CRC) is one of the partners of the Irish network of CRCs that is currently funded by the HRB under the Dublin Centre for Clinical Research (DCCR) programme. In this capacity, RCSI is committed to supporting the development of a national clinical research infrastructure for clinical trials that can deliver an internationally-competitive clinical research system for industry-sponsored trials across multiple hospital sites.

RCSI is committed to fostering research collaborations between biomedical scientists and clinicians

2.2 PROMOTING AND FACILITATING THE ENGAGEMENT OF CLINICIANS IN TRANSLATIONAL RESEARCH AND TRAINING INITIATIVES

Over the coming years, RCSI is committed to fostering research collaborations between biomedical scientists and clinicians and has appointed a Deputy Director of Clinical Research to promote this interaction. We will develop new, and strengthen existing, multidisciplinary research teams in order to ensure cross-fertilisation between basic scientific concepts and clinical needs. There will be greater opportunities for scientists to engage with research in a clinical setting as well as for clinicians to enhance their research skills and acquire new research techniques. This goal will be fulfilled through:

- Targeted use of seed funds that promotes interdisciplinary projects between clinicians and scientists.
- Enhanced support to clinicians in funding applications and post-award management.
- The provision of training in research methods and laboratory techniques as part of the undergraduate educational curriculum and the incentivisation of medical students to undertake summer research projects under the joint supervision of clinicians and scientists, as part of RCSI's research summer school training programme.
- The development of plans that attract clinicians to research and facilitates the establishment of joint activities between RCSI and affiliated hospitals.
- The development of enhanced support delivered by the RCSI CRC to attract more investigator-led and industry-sponsored clinical trials.
- A greater role for RCSI CRC in the planning and oversight of clinical trials and the implementation of activities that support clinical research.

2.3 BUILDING CAPACITY IN MULTIDISCIPLINARY BIOMEDICAL RESEARCH

In a research landscape where major amounts of infrastructural and research funding go towards the development and support of large-scale research centres, it is imperative that RCSI promotes the establishment of large multidisciplinary research networks and programmes that are innovative, sustainable and aligned to the new national and European research funding priorities. To this end, we will:

- Review our research capabilities to identify and develop collaborative networks within RCSI, Ireland and abroad that can deliver interdisciplinary expertise, synergy and impactful research that is competitive for funding support. To achieve this, we will incentivise the establishment of large multidisciplinary research programmes through seed-funding awards and we will encourage RCSI participation in funding schemes (e.g. EU COST action) that support the establishment of international research networks. One example of a research area in which RCSI could be competitive is miRNA. Over the past few years, research on the role of miRNAs in disease has become a major thematic area at RCSI, as evidenced by 45 peer-reviewed

primary and/or review articles and several major grant awards. At least 13 PIs have expressed interest in the development of miRNAs as biomarkers and/or therapeutics in various areas, including diabetes mellitus, obesity, cancer, epilepsy, neurodegenerative disorders, inflammation, pulmonary disorders, infection and regenerative medicine. Given the level of interest and existing accomplishment in miRNA research, RCSI will seek to develop multidisciplinary programmes in this area. To achieve this, we will promote the establishment of international collaborations and networking activities (including a COST action), the development of industry collaborations, and the establishment of a Centre for miRNA Therapeutics and Diagnostics.

- Support and further develop existing multidisciplinary programmes (described in Annex 1). Complex biomedical problems often require an interdisciplinary approach in order to be successfully solved. To achieve this, RCSI will seek to establish interdisciplinary research centres of excellence focused on areas where RCSI has a strong record of accomplishment and critical mass. The establishment of such centres will provide focus, further develop institutional strengths and increase the visibility of RCSI research. Such centres will also assist with keeping RCSI's research strategy aligned with national and international funding strategies and will make RCSI more competitive for funding under the SFI Research Centres and other national and international funding schemes. One example of such centres is RCSI's Centre for Systems Medicine (CSM) [www.systemsmedicineireland.ie], which has a mission to undertake translational, multidisciplinary research that identifies proteins and genes implicated in human disease.

Using systems biology and mathematical approaches, the CSM seeks to develop new prognostic tools and more personalised therapeutic approaches for the treatment of cancer, neurological disorders and diabetes. The CSM hosts, and collaborates in, multiple FP7 consortia (APO-DECIDE, ANGIO-PREDICT, SYS-MEL, EpimiRNA) and national centres (BREAST-PREDICT, GATSBY). The establishment of research centres will be subject to an internal review process (described in Annex 2).

- Promote applied research programmes to become competitive for funding schemes that require the participation of industry. To facilitate this, we will support pilot applied research studies through a seed-funding programme that promotes collaborations with industry.
- Enhance our research support services and infrastructures to sustain competitive research and attract new partners. We will ensure that our central research infrastructures are equipped with the resources required (equipment, support and training staff), and have in place well-managed access and sustainability plans.
- Implement and continuously enhance RCSI's strategic plan for the support of researchers with applications for Horizon 2020 (H2020) funding (Annex 3). To deliver the plan, RCSI will offer researchers the experience and support of Senior Research Officers and two consulting agencies with extensive expertise in EU and national funding. Researchers will be encouraged to develop long-term strategic research and funding plans and collaborative links in order to ensure that research capacity remains competitive for large collaborative research programmes.

3. PROMOTE APPLIED RESEARCH AND KNOWLEDGE TRANSFER

3.1 RATIONALE (INCLUDING ALIGNMENT WITH INSTITUTIONAL, NATIONAL AND EU STRATEGIES)

National and international funding strategies are now prioritising applied research that has societal impact and more immediate commercialisation potential. In Ireland, the very first action of the Irish Government's 'Action Plan for Jobs' initiative was the publication of a report on the National Research Prioritisation Exercise (NRPE). The aim of the NRPE is to accelerate the delivery of economic outcomes from the Government investment in research organisations by aligning future public investment to 14 areas of opportunity that have been identified in the report (published in November 2011). RCSI ongoing research is aligned with the NRPE in the area of Medical Devices; Diagnostics; Therapeutics: Synthesis, Formulation, Processing & Drug Delivery; and Processing Technologies & Novel Materials. Two other areas – Connected Health & Independent Living, and Manufacturing Competitiveness – are of developing interest to RCSI researchers. In each of these areas, a significant focus is on products and processes.

The shift in focus of the national research strategy is reflected in SFI's Agenda 2020. Over the last 15 years SFI has provided the greatest amount of funding support for RCSI biomedical research programmes. The SFI's Agenda 2020 has a vision that Ireland will be a global knowledge leader that places scientific and engineering research at the core of its society to power economic development and social progress. In addition, SFI's mission is to build and

strengthen scientific and engineering research and its infrastructure in the areas of greatest strategic value to Ireland's long-term competitiveness and development.

As part of its new strategy, SFI is now funding fewer investigator project grants to prioritise the establishment of large centres of excellence under the SFI Research Centres Programme. The aim of this programme, which is the continuation and expansion of the earlier SFI Strategic Research Clusters (SRC) and the Centre for Science, Technology and Engineering (CSET) funding schemes, is to bring together academia and industry to address research questions relevant to the Irish economy and industry. RCSI has previously been a partner in three SFI SRCs, the Molecular Therapeutic for Cancer Ireland, the Irish Drug Delivery Research Network [www.ucd.ie/iddn], and the CSET Biomedical Diagnostic Initiative [www.bdi.ie]. Very encouragingly, in the first year of the programme, RCSI has been involved in two (of seven) successful new Centre's programmes: the Advanced Materials and BioEngineering Research (AMBER) [www.ambercentre.ie] Centre, in which RCSI plays a co-leadership role with Trinity College Dublin, and the Irish Centre for Fetal and Neonatal Translational Research (INFANT) [www.infantcentre.ie]. Industry co-funding is also an essential requirement for these centres. AMBER already has commitments from 22 industry partners, providing a funding contribution of €23m out of the total €58m budget, whereas

Ireland is the top European location for both international pharmaceutical investment and medical device investment

INFANT's 15 industry partners have committed to €6m out of the total €14m budget.

It is imperative that RCSI's research strategy is aligned to the shifting funding landscape and identifies ways to promote and support new and existing research projects that can attract industry interest and support. In doing so, RCSI will also become more competitive for Horizon 2020 (H2020) funding. The aim of the third pillar of H2020 in industrial leadership is, to boost job creation and stimulate private investment in research and innovation. To achieve this, the industrial leadership pillar supports research programmes that lead to the development of key enabling technologies (KETs) and provide a greater access to capital and support for small and medium-sized enterprises (SMEs). In H2020, it is expected that 20%, or about €8.65bn, of the total combined budgets allocated to 'Leadership in enabling and industrial technologies' (LEITs) and the 'Societal Challenges' will go to SMEs. H2020 also offers funding for collaborative research and training programmes with industry under the Marie Skłodowska-Curie Innovative Training Network (ITN), the Research & Innovation Staff Exchange (RISE) and European Industrial Doctorate (EID) programmes.

Being based in Ireland, RCSI research has opportunities for engagement with industry that are unique in Europe and include:

- Ireland is the number one European location for both international pharmaceutical investment and medical device investment.
- There are 250 medical technology companies in Ireland, exporting €7.9bn worth of product annually and employing 25,000 people. Half of these companies are indigenous.
- Thirty FDA-approved pharmaceutical /

biopharmaceutical plants are located in Ireland with eight of the 'top 10' global pharmaceutical and biopharmaceutical companies having integrated manufacturing operations in Ireland.

- Six of 10 of the world's top-selling drugs are now produced in Ireland.
- In 2013, exports of pharmaceutical and medicinal products exceeded €21.6bn, making Ireland one of the largest net exporters of pharmaceuticals in the world.

As a specialist Higher Education Institute, RCSI can offer unique opportunities for industry that include:

- Its exclusive focus on healthcare, an area that by its very nature fosters a spirit of interdisciplinary collaboration.
- RCSI's size and independent status can also offer a more flexible and agile approach to negotiation of contracts with third parties.
- The clinical and health focus of RCSI educational and research activities facilitate links with end users of industry technologies – hospitals, clinicians, pharmacists in industry (for example through PIER [<http://www.pier.ie/>])
- Its impressive and well-defined portfolio of clinical expertise, translational research programmes, network of clinicians (RCSI Alumni) across the globe, and state of the art biomedical and clinical research infrastructures.

Since its establishment in 1998, Enterprise Ireland (EI) has been the

RCSI principal investigators will be provided with upskilling opportunities in knowledge transfer and support for identifying relevant industry partners

traditional funding agency, which provides funding supports for Irish HEIs in applied research and commercialisation of research. EI also provides research commercialisation support to explore commercial potential, set up university spin off companies, and a range of collaborative funding programmes to support academic/ industrial research partnerships. More recently, in partnership with EI, SFI has established the Technology Innovation Development Award to fund studies with commercial potential.

RCSI principal investigators will be provided with upskilling opportunities in knowledge transfer and support for identifying relevant industry partners.

While RCSI has been reasonably successful at obtaining EI funding, a recent internal review has highlighted that many RCSI principal investigators require further up-skilling and support in the area of applied research and knowledge transfer. To make more informed and independent technology transfer decisions, PIs require training and guidance in the assessment of the commercialisation potential of research and business planning, in the identification of funding support mechanisms and potential industry partners, in the protection of invention and the identification of suitable commercialisation pathways and regulatory requirements.

In response to this review and in alignment with national and international funding strategies, RCSI will undertake a more pro-active, structured, and results-oriented approach towards technology transfer activities and support.



3.2 ACTION PLAN

To promote applied research we will implement the following action plan:

Review

We will engage experts in technology transfer to review RCSI's patent portfolio and research that could be of interest to industry.

Coaching

We will provide coaching opportunities for researchers to help them identify applied research opportunities from the enhancement of existing, or the development of new technologies from their labs. We will also assess the novelty and the commercial potential of their ideas, identify suitable industry and academic partners (where required) and assess the most suitable funding vehicle, including, where possible, support from industry.

Training

We will provide training on knowledge transfer, IP protection and commercialisation pathways, associated requirements and regulatory barriers to market entry.

Mentorship

We will introduce a mentorship scheme delivered by industrial representatives and researchers with substantial experience in applied research, e.g. one-hour seminars every quarter.

Seminars and workshops

We will organise regular information sessions on commercialisation supports and dedicated, thematic workshops / bilateral meetings where PIs and industry representatives will be able to interact and detail the possibilities of interactions.

Industry liaison and business development:

We will create a database of national and international industry contacts so that researchers can identify appropriate commercial partners. We will also assist researchers with evaluation of the commercial potential of their research discoveries.

Communication

We will implement a research communication strategy that promotes RCSI scientific and clinical expertise, technologies and infrastructures, to attract industry partners. This could include the development of brochures, presentations at industry-focused events (e.g. MedTech in Ireland for the medical device sector) and more proactive communication with industry-focused agencies such as EI and IDA.

Networking

We will reach RCSI Alumni working in industry and use these contacts to promote RCSI research.

Approach and reputation

We will implement a more pragmatic/ flexible approach to third party engagement and seek to develop a portfolio of industry contacts rather than focusing on a limited number of industry partners. We will seek to develop a reputation of exceptional flexibility and efficiency in the negotiation and execution of contracts and agreements.

3.3 EXPECTED IMPACT

The success of this plan will be measured by:

- An increase in the number of applied research projects that are competitive for funding support.
- An increase in the number of research projects that are co-funded by industry.
- An increase in number of collaborative research and service agreements with industry.
- The execution of multiple sequential contracts with industry as a measure of industry satisfaction
- Positive feedback from researchers for having become more knowledgeable and being better supported in the area of technology transfer;
- An increase in commercialisation activity including the number of Invention Disclosure Forms, patents filed, licensing agreements, and spinout companies; and,
- An increase in joint industry-academic publications from RCSI.

4. PROMOTION OF POPULATION HEALTH AND HEALTH SERVICES RESEARCH (PHHSR)

4.1 THE RESEARCH VISION

The mission of RCSI Population Health and Health Service (PHHS) research is to understand, safeguard and improve the health of human populations and individuals through education and research. PHHSR at RCSI focuses on the development and application of methodological approaches for PHHSR, the understanding of health, diseases and their determinants, the testing of interventions and the design of health services to promote and protect health. Ultimately, RCSI PHHSR seeks to train research practitioners, undertake and translate the findings of population health and health services research into policy and practice.

The volume and impact of RCSI PHHS research and outputs moved into a higher gear in 2005-2006 with the appointments of new heads of departments in Psychology, General Practice, Epidemiology and Public Health Medicine, and, in 2007, the coming together of these three academic departments as a new division of Population Health Sciences (PHS). The expansion of RCSI research in PHHS has been enabled by the introduction of national and international funding schemes that have supported RCSI-led large inter-institutional research programmes. Nationally, the HRB has become the main funding agency that supports health research for the benefit of patients and the public health system. To fulfil its mission to improve people's health, the HRB has set the strategic

goal to build capacity in high-quality population health sciences and health service research, which generates knowledge that can be translated into policy and practice. Recent examples of large research and training programmes led by RCSI are the HRB Scholars PhD Programme and the Centre for Primary Care Research, both funded competitively in 2007. These and other examples of RCSI-led national and international PHHS research and training programmes are reported in section 5 and Annex 1 of this document.

Through funded-research projects and doctoral (PhD) training programmes, the Division of PHS has expanded and become a multidisciplinary critical mass of clinicians, epidemiologists, biostatisticians, health psychologists and social scientists.

The establishment of new Biostatistics posts in 2007 and 2013 has supported research development within PHS and across RCSI.

Together PHS staff have strengthened and expanded RCSI's disciplinary strengths and developed novel multidisciplinary and mixed methods approaches to PHHS research.

RCSI PHHSR seeks to train research practitioners, undertake and translate the findings of population health and health services research into policy and practice.

4.2 THE RESEARCH PLAN

The track-record of RCSI PHHS scientists in establishing and leading large multi-institutional PHHS research consortia will set the basis for continued research growth, nationally and internationally. National and global priorities that address population health needs will drive the consolidation of existing or the establishment of new PHHS research programmes and networks.

Existing and new strategic partnerships with funders and key research organisations will be nurtured and developed. As proposed in Professor John Higgins' report to the Irish Minister for Health on The Establishment of Hospitals Groups as a transition to Independent Hospital Trusts, RCSI will work within RCSI Hospitals to align undergraduate and postgraduate education, research and service delivery at RCSI Hospitals and national level.

New areas, priorities and opportunities for PHHSR will arise in the areas of:

- Observational epidemiological studies, utilising national datasets such as the Irish Longitudinal Study on Ageing (TILDA), Growing Up in Ireland (GUI), Primary Care Reimbursement Services (PCRS) and Hospital Inpatient Enquiry (HIPE).
- Health workforce research, an area of growing research interest given the scale of emigration of Irish doctors, the globalised nature of health professional migration, the costs and impacts on source-countries, and the need for effective retention measures.
- ICT interventions that enhance patient safety in terms of diagnostic and prescribing approaches, which will be assessed through large, pragmatic, community-based randomised controlled trials (RCTs).

- Major non-communicable diseases – such as cardiovascular, cerebrovascular disease and diabetes mellitus – to improve care and to enhance knowledge about health behaviours and risk factors among professionals and the public.
- Health and medical educational research, covering under-graduate and postgraduate teaching programmes (as described in section 5).
- Underlying psychometric processes of instrument and concept development for population and health services research – in areas such as quality of life, ageing, and adherence to healthcare advice.

Research at the Division of PHS will be reconfigured to become RCSI's Centre for Population Health and Health Services Research (CPHHSR). The CPHHSR will constitute a multidisciplinary critical mass of research, active academics and full time researchers from the Departments of Psychology, General Practice and Epidemiology and Public Health Medicine with strong national and international collaborations. These collaborations will be nourished and expanded. Key for the development of these collaborations will be the introduction of a new modular technology enhanced learning (TeL) MSc in Health Research. The TeL MSc in Health Research will build on RCSI's proven track record in PhD training, Masters in Surgery and delivery of short courses to students in PHHSR methods. Its modular e-format will deliver flexible training paths, enabling the development of cross-disciplinary and discipline-specific research modules in the fields of Health Professions Education, Pharmacy, Nursing, Management & Leadership, which address specific or more generic training needs. It is envisaged that

the TeL MSc in Health Research will become a unique educational platform that will accelerate the growth and graduation of the new generation of

PHHSR researchers supporting health service professionals, managers and policy makers, both nationally and internationally.

4.3 EXPECTED IMPACT

RCSI will increasingly be recognised for its use of new learning technologies in the development of the next generation of PHHSR researchers who will be contributing to research-based health policy and practice at home and abroad, and to the training of RCSI medical graduates, in Ireland and in our overseas colleges, whose life-long clinical practice will continue to be informed by the latest evidence coming from population and health services research.

RCSI's growth and impact in the field of PHHSR will be manifested in a growth in the numbers of students undergoing research methods training – through short course, doctoral and Masters training programmes. The numbers of graduates will be relatively small during the start-up phase in the delivery of TeL, blended learning programmes, while early lesson learning is taking place. By 2018, following the graduation of the first cohort of Irish-based students from the TeL MSc in Health Research, we will develop a plan and a platform for expanding this programme internationally.

Through the nurturing of partnerships with like-minded research leaders in other Irish HEIs and, perhaps, overseas partners, in Europe, Asia and Africa, it is anticipated that RCSI's TeL MSc may provide the nucleus for taught course collaborations with other HEIs at Masters level. Building on the foundations laid between 2006 and 2013, the TeL platform will position RCSI as a centre of excellence for the provision of discipline-

specific, multi-disciplinary and mixed methods research training.

During the lifetime of this Research Strategy, we anticipate that PHHSR will continue to grow and deliver impactful research, through journal articles and other forms of scientific dissemination. It also expected that RCSI PHHS researchers will strengthen their links with national and international policy makers, hospital managers and training bodies, placing the CPHHSR in a prominent position in Ireland and abroad for the delivery of cutting-edge research and training that meets the short and longer term knowledge needs of knowledge users.



5. STRENGTHEN THE INTERSECTION OF RESEARCH AND EDUCATION

5.1 TRAINING FOR POSTGRADUATE STUDENTS

Developments and achievements

Much of the success of RCSI research is dependent upon the work carried out by postgraduate students as part of postgraduate training programmes leading to a PhD or an MD degree. In turn, the quality and impact of training provided to these students and the supervisory efforts of the host research teams have a major bearing on the quality of RCSI research output. It is, therefore, critically important that research and research training strategies are aligned, so that the plan to deliver enhanced training and development opportunities for the students also supports excellent research and strengthens the institutional research capacity.

Over the past decade this alignment has been successful in securing funding for large collaborative PhD programmes. RCSI has played a key role in the promotion of postgraduate research training. It was the first Irish institution to establish a structured PhD programme, which, over time, developed into larger programmes funded by the HEA and the HRB. The curriculum has also evolved to address the changing needs of research, trainees, employers and society.

The unifying mission of RCSI-structured PhD programmes is to deliver world-class training for biomedical and health services researchers, who, on completion of their training programme, are qualified to embark on a broad range of career

paths and become the next generation of leaders contributing to human health. While RCSI recognises that the core of PhD education is original research, RCSI structured PhD programmes provide training in a broader set of professional competencies. These include Research Methods and Statistical Analysis; Scientific Reasoning and Logic; Communication; Research Ethics; Project Management; Professional Feedback; Research Writing; Leadership and Management; Entrepreneurship; Teaching, Research into Policy, etc.

Examples of RCSI postgraduate training programmes include:

In Population Health and Health Service Research:

- The HRB-funded Scholars PhD Programme (2007-13), the first national structured PhD Programme in Health Services Research. It was run jointly with Trinity College Dublin and University College Cork. Its success has led to a further HRB investment of €6.3m into the Structured Population and Health-services Research Education (SPHeRE) Programme (2013-2021) [www.sphereprogramme.ie]. SPHeRE is an innovative and ambitious research programme with a wider institutional membership, which aims to create a network of highly trained researchers who can competently undertake research in the current Irish health system and make

The unifying mission of RCSI-structured PhD programmes is to deliver world-class training for biomedical and health services researchers

recommendations that inform policy and lead to initiatives that improve population health and health service delivery for the people of Ireland.

The Chraic PhD Programme (2008-2013), which builds on the PhD Programme in Population Health and Health Services Research with TCD and UCC, and involves universities in six African countries [www.chraic.org].

In Biomedical Research:

- The HRB-funded PhD training programmes in Diagnostics and Therapeutics for Human Disease, with partner DCU (2007-2014).
- The Clinician Scientist Programme, in collaboration with UCD, TCD and UCC, funded by the HEA under PRTL Cycle 4 (2008-2012).
- The PhD training Programme in Biophotonics and Imaging under the NBIPI initiative, funded by the HEA under PRTL Cycle 4 (2008-2012).
- The Marie Curie Career Enhancement and Mobility Programme (CEMP) (2009-2012) for the training and development of postdoctoral fellows in Biophotonics and Imaging, under the umbrella of the NBIPI initiative, co-funded by the HEA under PRTL cycle 4 and the FP7 Marie Curie CoFund scheme.
- The structured PhD programme in BioAnalysis and Therapeutics (BioAT) [www.dcu.ie/bioat] (2011-2015), a collaborative inter-institutional four-year structured PhD Programme which addresses the challenge of increasing the quality, quantity and entrepreneurial skills of Ireland's graduate biomedical researchers for the biopharmaceutical and biomedical device industries. BioAT enables students to broaden their skills base and career opportunities through participation in high quality research, advanced training, personal and professional development, and exposure to innovative and

interdisciplinary translational research environments.

The challenge

With the exception of the HRB funding towards PHHSR, the national support for structured PhD biomedical training programmes has ceased, leading to a decline in the institutional intake of PhD students from 2010 to 2012.

The action plan

Raising PhD numbers is an important institutional goal that requires cooperative initiatives and joint efforts from the Research Institute, the School of Postgraduate Studies and the Heads of Schools and Departments, who will ensure that the engagement of all academic staff in PhD supervision becomes the norm.

To continue to increase the intake of PhD students and to ensure that the quality of training opportunities is informed by the needs of research over the coming years, we have formulated the following action plan:

- To strengthen the links between the Office of Research and Innovation (ORI) and the School of Postgraduate Studies (SPGS) in order to ensure that the postgraduate training plan addresses the changing needs of research and is aligned to RCSI's research strategy.

This will be achieved with:

- The engagement of the Head of the School of Postgraduate Studies in the planning and implementation of the research strategy.
- The involvement of the School of Postgraduate Studies in the implementation of the Institutional Strategic Approach for H2020 and other national and international funding schemes to support the preparation of proposals with a postgraduate training component (e.g.

MSCA ITNs).

- The engagement of the ORI Funding Application Support team in the provision of postgraduate training on how to apply for funding, how to plan and manage collaborative research programmes, and how to prepare personal strategic research and funding plans.
- The engagement of the School of Postgraduate Studies in the planning and implementation of RCSI's Human Resources Strategy for Researchers. In particular, it will be the remit of the SPGS to enhance the quality of supervision to deliver better training and research outcomes. A new plan for supervision will also be required to address the challenge of increasing our postgraduate training capacity, including the ability to effectively supervise increasing numbers of students by RCSI faculty. We need to plan and implement a formal co-supervision model which involves senior mentors of junior academic staff and post-doctoral researchers and which is recognised and supported by adequate training and supervisory standards.
- A joint approach towards the identification and implementation of international initiatives that support postgraduate student mobility programmes (e.g. SFI-funded International Strategic Cooperation Award Programmes with Brazil and Japan) and other international initiatives (such as newly established EU COST actions).
- The promotion of mobility (incoming and outgoing) of students through the establishment of cotutelle agreements with international partner research institutions.
- The continuation of support for RCSI participation in the Irish Research Council (IRC) Postgraduate Studentship Programme, with the provision of funding that supplements the IRC budget towards consumables, which

is too modest to deliver quality laboratory-based research.

- The support of RCSI participation in Marie Skłodowska Curie Initial Training Networks.
- The delivery of new training modules that address the traditional needs of:
 - (a) Population health and health services research (e.g. training in qualitative and quantitative research methods).
 - (b) Clinical research (in the planning and implementation of clinical trials)
 - (c) Applied research (how to protect IP and commercialise research, etc.)
- The delivery of new training modules in a non-traditional context for:
 - » Hospitals (e.g., understanding health services needs and regulations);
 - » Industry (e.g., understanding R&D approaches in industry); and,
 - » Multi-sectorial settings (e.g., how to plan and manage large collaborative programmes that are competitive for H2020 funding).

In particular, RCSI is set to deliver a new training plan that covers the following areas:

(a) Technology transfer and commercialisation of research

The aim of this training is to teach students how to make their research more impactful and to help them understand the perspective of industry, as a research partner, potential customer or employer. The training will include modules on the commercialisation avenues of research, on how to evaluate and protect inventions, how to choose the most suitable commercialisation route, understanding the regulatory process and how to engage with industry.

(b) Planning and managing clinical research

The training will include modules on the basic regulatory and contractual requirements of clinical research and how to plan clinical trials.

5.2 TRAINING IN POPULATION HEALTH AND HEALTH SERVICES RESEARCH

Central to the vision and sustainability of RCSI PHHSR and its ability to address research and knowledge needs, is the establishment of a platform for training the next generation of PHHS researchers. The focus will continue to be on those who wish to embark on full-time careers as academic researchers. However, increasingly we will also focus on those who need to strengthen their competencies for understanding, commissioning and/or undertaking research within their professional roles as clinicians, managers and policy makers with responsibility for population health and the delivery of health services. This will be achieved through three channels – doctoral, masters and short course training – where the appropriate use of innovative and technology enhanced learning (TeL) methods will be used. This will enable RCSI to extend its PHHSR reach, nationally and internationally, mirroring and also supporting its established track record as one of the foremost international medical schools, worldwide.

Within the context of the SPHeRE programme, RCSI-TCD-UCC partnership will seek to expand and include all of the universities in Ireland to increase the focus on PHHS research nationally, to formalise the teaching modules in the first year to an inter-institutional Level 9 Diploma award, and to increase access to the taught material through development of e-learning modules. The successful Masters in Healthcare Ethics and Law will continue to provide professionals with a high-level grounding in the ethics frameworks, laws and regulation within which health professionals and researchers work.

RCSI's Division of Population Health Sciences will continue to provide a one-week short course in research methods and will deliver the Biostatistical Consulting and Support Service (BCSS). This service will initially be available to RCSI academic and research staff, with the potential for expansion to staff in RCSI Hospitals. Scaling-up short course training and biostatistics support is planned through building our TeL capacity to develop online and blended learning teaching resources, which will be an interim stage towards the development of a blended learning Masters.

Building on an RCSI-accredited MSc in Health Research (which is run in collaboration with RCSI academic partner in Penang Medical College, Malaysia), and within the TeL strategy developed by the Health Professions Education Centre (HPEC), the Division of PHHSR will develop a TeL MSc in Health Research. PHHSR training will continue with incremental progression from Short Course in Research Methods (which will be converted into an ECTS-approved Certificate), leading to Masters in Health Research and PhD opportunities through the SPHeRE Programme. It is anticipated that the courses offered will be Bologna-compliant and enable postgraduate students to accrue ECTS credits that enable tailored postgraduate training in PHHSR.



5.3 TRAINING OF UNDERGRADUATE STUDENTS

RCSI genuinely believes in the synergy between teaching and research. Lecturers at the forefront of research ensure that the most up-to-date and pertinent information is given, which is particularly important in the health sciences where advances are rapidly occurring. This instils greater enthusiasm amongst the students for the topic being taught and for engaging in research projects. Conversely, ideas for further research can emerge from the teaching process and interaction with students.

To facilitate the engagement of students in research, in 2010 RCSI established the Research Summer School (RSS) [<http://rss.rcsi.ie/>]. The school is open to all RCSI health sciences students (from the Medical School, the School of Pharmacy and the School of Physiotherapy, across all RCSI campuses, including Bahrain and Penang). It is jointly supported by the Alumni Office, corporate donors, the Office of Research and Innovation and the Student and Regulatory Affairs (SARA) Office.

The aims of the school's programme are to:

- Encourage and support undergraduate students in carrying out basic science research in the dynamic context of RCSI's Research Institute for a period of eight weeks during the summer.
- Communicate the passion of RCSI scientists for biomedical and population health research to undergraduate students while they are undertaking their research project.
- Train undergraduate students in 'hands on' basic laboratory techniques and provide them with the skills for critically assessing current research and communicating their research findings.
- Make their research experience relevant to their undergraduate education.

The desirable outcomes of the summer school experience for students are that they:

- Gain a better understanding of how basic science research 'works'.
- Equip themselves with the skills to debate and criticise current 'hot topics' in research.
- Acquire the desire and curiosity to continue to engage in research during the remainder of their undergraduate training and further on, into their clinical years.
- Encourage their peers to become involved in research.

The programme includes a laboratory-based or PHHS research project and a taught component which provides skills in research project management, experimental design, calculation, record keeping, clinical study design, statistics, scientific writing, ethics and laboratory techniques.

The programme also includes a 'Discovery Series' where RCSI researchers discuss with the students their areas of research. Topics include cancer research, stroke models, epilepsy, schizophrenia, drug design and clinical trials. Being at the intersection of education and research, the research summer school plays an important role in the formation of undergraduate students and the promotion of research. It is, therefore, ideally positioned to contribute to the implementation of RCSI's strategic plan in education and research and to deliver joint educational and research initiatives. To promote translational research, increase the engagement of clinicians from RCSI Hospitals and enhance the quality of RCSI's educational curriculum through training in research, RCSI will continue to enhance and promote the RSS training programme with the

objective of increasing the number of medical students that undertake summer research projects under the joint supervision of clinicians and scientists. We will also seek industrial partners' support and participation in the programme, we will strengthen our collaborative links with other HEIs

through the introduction of an 'Exchange Programme' and we will continue to support our award-winning International Conference for Healthcare and Medical Students (ICHAMS) [<http://ichams.org/>] to help our students disseminate their research findings and forge collaborations with investigators from other HEIs.

5.4 NEW DEVELOPMENT - HEALTH PROFESSIONS EDUCATION RESEARCH

The mission of health professions education (HPE) at RCSI is to train educators from all health professions to promote excellence in teaching, translate theory and novel strategies to the learning environment, and promote research that is informed by education needs in different health settings (e.g., clinical and academic, national and international, inter-professional), expand knowledge in the field, and develop new methodologies and approaches that can be translated into more advanced health professions education practices.

While RCSI has had some ongoing activity in this area, the establishment of a Health Professions Education Centre (HPEC) in 2013 reflects RCSI's ambition to substantially grow this area of research. The HPE research strategy will build on organisational capability, and enhance partnerships, e.g., with RCSI international sites such as RCSI Bahrain, Penang Medical College and Perdana University; with national partners such as 3U (RCSI with NUI Maynooth and Dublin City University) and with existing international links, e.g., Maastricht University (Netherlands), The Mayo Clinic (US) and McGill University (Canada).

Two areas where RCSI is ideally placed to make a unique contribution to health professions education research are multiculturalism and inter-professional

education. The HPE research strategy will benefit from RCSI's intrinsic multicultural environment both within and across campuses, to develop evidence-based research programmes in health professions education in an increasingly international educational environment relevant to health professions. As a completely health sciences-focused, single faculty organisation, the opportunity for inter-professional education is optimised at undergraduate, postgraduate and continuing professional development education levels. The HPEC will use these opportunities to inform international practice through research. Visiting academics (e.g., through the Educator in Residence Programme) targeted education meetings and emphasis on early scholarly publications will build the College's reputation in this area.

Two areas where RCSI is ideally placed to make a unique contribution to health professions education research are multiculturalism and inter-professional education

Addressing the challenges of HPE research at RCSI

To introduce a quality HPE research programme at RCSI, a number of gaps will be filled:

- **Analytical and methodological gaps** – HPEC and other College staff will provide the necessary research tools and standards (e.g. statistical input from the proposal stage to analysis, access to qualitative data analysis software, e.g., N-Vivo.) and development opportunities. These will include:
 - » Educator's Toolkit (to support excellence in educational practice): a National University of Ireland (NUI)/RCSI-accredited Diploma in Health Professions Education launched in Autumn 2014, aiming to support the educational and developmental needs of faculty involved in teaching undergraduate health professional students. As successful research in health professions education springs from educational activity, it is expected that participation will assist in the reflective development of relevant research questions embedded in practice.
 - » Educator's Research Toolkit (to support the development of appropriate research skills focused on health professions education): an NUI-accredited Diploma, to be launched in 2016, will aim to support the health professions education research needs of faculty involved in teaching medical students.
- **Knowledge gap** – Recognising the challenge for busy educators to address their knowledge gap in the field of HPE, HPEC staff will build groups of those individuals under RCSI's themes and support them in research.
- **Capacity gap** – To maximise the impact of our research efforts, HPEC will promote the establishment of collaborative and interdisciplinary

research projects with national and international partners. The HPEC was invited to join the Best Evidence Medical Education (BEME) Collaboration as one of 12 BEME International Collaborating Centres (BICC) in 2014. Participation at this level will increase RCSI's profile, research output and connectivity. The Best Evidence Medical Education (BEME) Collaboration (Harden et al., 1999) is an international group of individuals, universities and professional organisations committed to the development of evidence-informed education in the medical and health professions through:

- » the dissemination of information which allows teachers and stakeholders in the medical and health professions to make decisions on the basis of the best evidence available;
- » the production of systematic reviews which present the best available evidence and meet the needs of the user; and,
- » the creation of a culture of best evidence education amongst individuals, institutions and national bodies.

BEME's goal is to provide, and to make available, the latest findings from scientifically-grounded educational research. This is to enable teachers and administrators to make informed decisions about the kinds of evidence-based education initiatives that boost learner performance on cognitive and clinical measures. As a BEME International Collaborating Centre, RCSI will undertake reviews and promote the development of new methodologies.

Research themes

RCSI research in health professions education will be informed by its core teaching activities. This efficient and effective way of building educational research maintains focus and enriches

educational programmes. The focus will also be on studies that are applicable to an international setting and have a strong conceptual framework. RCSI research in HPE will focus on the following themes:

Integrated consultation skills:
This is a major HPEC development stream and it includes the professional consultation, doctor-patient and inter-professional communication, all forms of communication (verbal, non-verbal, written, social media etc.), simulation in all its forms (mannequins, simulated patients and hybrid simulation), together with clinical reasoning.

Professionalism:

The teaching of professionalism is being formalised as a vertical theme in RCSI's curriculum. This includes developing a shared institutional definition of professionalism (as action research with international partners), enacting a targeted educational intervention and assessing its outcome for students and faculty with a mixed methods approach. Its translation across disciplines and international RCSI sites will form the basis for ongoing evaluation.

Culture and health professions education:

RCSI's international student population in Dublin (>60 nationalities represented) and its international education sites provide unparalleled opportunities to address cultural aspects across topics such as student experiences, educational approaches and curriculum fit for multiple and international sites. A series of projects will be highlighted at a range of events, including the annual International Education Forum and the monthly Medical Education Research Group (MERG) video-linked meetings, to optimise cross-site cooperation within RCSI.

Technology Enhanced Learning (TeL):
RCSI is making significant investments

in personnel and technologies for education. RCSI's TeL Strategy (Autumn 2014) provides the basis for evaluation of prioritised initiatives. This will include the introduction of smart technologies into clinical settings, novel methods for delivering education, and gaming solutions to educating in regard to complex clinical reasoning. These projects will work to meet the specific educational challenges and needs of Faculty across specialties and courses, while optimising the opportunity to evaluate the educational impact on programme developments.

The Pedagogy of Learning:

This is a cross-cutting theme. Currently, HPEC focuses on educational development, e.g., peer observation of teaching and science-based education activity (N-STEP project). As the educational strategy develops, and as the Teaching and Learning Committee approves new initiatives, there will be opportunities for research.

Transitions in education:

Building on RCSI research on students' first year transition journey (school to university), and on their experiences of internship and fitness to practice (medical school to clinical practice), there is scope to further explore student experiences of transition (school to college, pre-clinical to clinical, in Ireland and at international sites).

Inter-professional education (IPE) and transnational education:

RCSI recognises the need to leverage more in terms of IPE and transnational research. Potential areas of interest are communication skills and professionalism as well as the pedagogy of learning (e.g., transitions in education).

5.5 RESEARCH IN SURGICAL TRAINING

As the national postgraduate training body for surgeons in Ireland, RCSI is ideally positioned to develop research in surgical training.

The mission

The mission of RCSI research in surgical training is to "develop and validate new methodology and technologies that deliver excellent surgical training and the highest standards of surgical practice in the interest of patients and the quality of their care."

The primary focus of RCSI research in surgical training is simulation-based training. RCSI surgical training facilities avail of a combination of low and high fidelity simulators.

In the area of technology enhanced learning, the National Surgical Training Centre (NSTC) at RCSI has developed a moodle platform that facilitates interactive mandatory case-based discussions. This platform has been incorporated into RCSI's first global surgical training website [www.msurgery.ie] which covers all aspects of surgical training. A comprehensive, anatomy-based, competitive serious game has been developed and optimised. A new state-of-the-art training facility which will include a surgical skills laboratory (using both biological and virtual reality simulators, and mock operating theatres) will be opened in 2016. This will not only enhance the quality of simulation-based training but will also lead to the development of innovative training approaches and technologies.

The need

Global changes in healthcare delivery have prompted a significant change in the training of surgeons. The traditional 'apprentice-model' of surgical training

has been replaced by a shorter training programme with a shorter duration of practice and training components needed to achieve surgical competence. In recognition of these changes, RCSI has developed state-of-the-art training facilities within the NSTC. The NSTC provides simulation-based training in a safe environment, which ensures that trainees have demonstrated competencies in technical skills prior to operating on humans in the clinical setting.

To deliver a shortened training programme that retains appropriate levels of competitive progression and continue to generate high quality future surgeons, there is a continuous and growing need to evolve and deliver a fit-for purpose technical and non-technical curriculum, which develops and validates competency-based training progression using valid tools for assessment. This change in the delivery of surgical training has provided a unique opportunity for RCSI to develop competency-based training that embraces the latest technologies in the field of surgery.

RCSI's goal over the next five years is to develop novel assessment tools and continue to refine the selection process. We will establish collaborative links with industry to design and validate novel technologies in the area of TEL. Research will focus on three key areas of training development: skills acquisition and assessment, non-technical skills acquisition (human factors), and core knowledge.

RCSI's goal over the next five years is to develop novel assessment tools and continue to refine the selection process

(i) Skills acquisition and assessment

We will assess whether the skills obtained using simulators are transferrable to the operating room. To this end, we will determine whether the completion of a learning curve in a simulator equates to seamless progression in a live model. We will continue to rationalise the process of technical skills assessment to ensure that we are truly measuring the components of skill development we aspire to. This will be achieved through the creation of a scoring system that encompasses the outflow data from the simulators into an appropriately weighted score which reflects the technical ability of the trainee. Upon validation through research methods, this data will be used in the selection process for trainees once.

(ii) Non-technical skills acquisition (human factors)

Over the last decade, RCSI has established a human factors programme intended to address the acquisition of non-technical skills in surgery, which are central to the domains of good clinical practice outlined by the Medical Council, Ireland. Validation of this process is central to our research strategy in the coming years. We will utilise our existing data to establish the potential value of innate ability (aptitude) measurements in surgical novices to predict future performances as surgeons. We intend to explore the ability of serious gaming to enhance acquisition of non-technical skills.

(iii) Core knowledge

Since its inception in 2000, online postgraduate learning via the moodle platform has facilitated an interactive educational forum for trainees. The recent shortening of the surgical training pathway has placed increasing value upon this forum, as it has become an essential component of competency-based progression. Currently, selected US residency programmes are

attempting to validate these models of e-learning. The recent introduction of our first mobile app for surgical trainees (MSurgery) has been a significant development to support training using TeL. To validate this learning tool, we will utilise a US-based educational platform to determine if performances on this forum correlate with multiple variables generated during CST1 (First year of surgical training programme).



6. DEVELOP HUMAN RESOURCES STRATEGY FOR RESEARCHERS

The Institutional Strategic Plan 2013-2017, Growth and Excellence, states RCSI's commitment to research excellence is founded on 'supporting and nurturing an active research community'. It also affirms a strategic goal of investing in and developing its staff through the development of a best-in-class HR service, including the formulation of a new Learning & Development programme and Performance Development Review process. Overall, RCSI aims to offer an attractive, supportive and stimulating environment for all staff, including researchers, and to tailor opportunities for staff involved in research to help them develop their professional skills and career profiles, such that they are competitive, internationally and inter-sectorally. This goal of providing a quality-working environment for researchers is being achieved, in part, by the ongoing development of communication, interaction, engagement and career development opportunities for researchers as discussed in this document.

In addition, RCSI is committed to aligning its policies and practices with the European Commission's Charter for Researchers and Code of Conduct for the Recruitment of Researchers (Charter & Code). These are addressed to researchers, employers and funders, and set out the roles, responsibilities and entitlements of each. They describe a best practice framework for employing and developing researchers with the overarching aim of developing an attractive, open and sustainable European labour market for researchers.

The Commission has developed a tool for institutions to help them with the adoption and implementation of the Charter & Code principles. It is called the Human Resources Strategy for Researchers (HRS4R). RCSI's Office of Research & Innovation (ORI) and Department of Human Resources (HR) have committed to joining the third cohort of institutions in Europe to participate in this transparent, voluntary exercise in order to align RCSI policies and practices with the Charter & Code. The full submission to the EC can be found on the RCSI website at www.rcsi.ie/HRS4R

Ultimately, RCSI's aim is to promote openness in research recruitment and the introduction of career pathways and opportunities for career advancement for researchers, thereby contributing to the Commission's aims to give individual researchers the same rights and obligations wherever they may work throughout the European Union. This should help counter the fact that research careers in Europe are fragmented at local, regional, national or sectoral level, and allow Europe to make the most of its scientific potential.

The RCSI Strategy for researchers will make them more competitive by providing training in a number of areas

7. ENHANCE ORGANISATIONAL STRUCTURE FOR RESEARCH GOVERNANCE, MANAGEMENT AND SUPPORT

Over the past 10 years the governance and management structure of RCSI research has evolved significantly. This has been due to changes of research needs, leadership styles, and institutional and national research priorities.

The planning of this strategy, which has taken into account the view of all key stakeholders (researchers, research managers and institutional senior leaders) has offered a great opportunity to review RCSI's research management needs and put in place a management and support structure that better addresses the organisational needs of the institutional research plan and researchers at RCSI. The needs that the new organisational structure is set to address are associated with the multifaceted dimension of the institutional plan, which requires:

- » Coordination and integration of activities, support and resources.
- » Coherence of objectives and implementation plans, which may change over the lifetime of the strategy.
- » Responsiveness to changes and upcoming operational needs.
- » Monitoring and oversight.
- » Engagement and commitment.
- » Communication.

The new management structure includes:

- The Director of Research (DoR), who represents research in the Senior Management Team and has the overall responsibility for the implementation of the strategy and the running of RCSI's Research Institute. The DoR reports to

the CEO and, ultimately, to the Medicine and Health Sciences Board.

- The Research Management Team (RMT) which is formed by the Director of Research, the newly appointed Deputy Directors of Clinical and Applied Research, and the Associate Director of Research. The role of the RMT is to coordinate, promote and monitor the implementation of the research strategy action plan, manage institutional research resources (core research staff, infrastructures, institutional research programmes, funding and budgets) and the day-to-day running of RCSI's Research Institute.
- The Research Committee (RC), historically, plays an oversight role in the management of research. The main responsibilities of the RC are to advise the Director of Research on the institutional research strategy and ensure that institutional research plans and activities are sustainable and coherent with the Institutional strategy. The RC is also responsible for leading internal reviews of institutional research performance and resources (infrastructures and support staff). To support the implementation of this research plan, the membership of RC has been revised. It now includes the RMT and a proportionate representation from the key pillars of the research strategy: clinical research; biomedical research; applied research; population health and health service research; and, research in health profession education. Other members of the RC who will play an

important role in the implementation of the strategy are the Head of the School of Postgraduate Studies, the Director of the Clinical Research Centre and the Chief Academic Officer of the RCSI Hospitals. The representative from RCSI Bahrain in the RC will promote a greater interaction between RCSI Dublin and international sites.

Research support

Office of Research and Innovation (ORI): Director of Research (DoR), Research Management Team, Research Committee, and all researchers at RCSI are supported by the newly-established Office of Research and Innovation (ORI). The ORI brings together functions, resources and expertise of the formerly separate Research and Technology Transfer Offices. The aim of this merger is to deliver a more efficient and functionally integrated service for research. The ORI team includes five Research Officers and provides support and coordination on all aspects of research, including planning, administration, reporting, contract negotiation, IP protection, commercialisation, management of central research resources and infrastructure and communication. To support the planning and implementation of the research strategy and upcoming new initiatives, the ORI has recently hired two Senior Research Officers with significant experience in strategic planning, programme management and research reviews. It also avails of the expertise of external consultants to deliver the new institutional strategy for the support of researchers in the preparation of H2020 and other funding proposals (described in Annex 3) and for advice and support on technology transfer matters. Support and promotion of commercialisation activities and collaborations with industry will be further strengthened by the appointment of a Business Development Manager.

The Researchers Forum

Feedback from researchers on the earlier

management structure had highlighted the need to improve the communication between decision makers and staff, so that decisions are better informed (through a bottom-up approach) and are more widely disseminated. This in turn will deliver a greater engagement and commitment of researchers in the implementation of the strategy action plan.

This feedback has led to the establishment of the Researchers Forum. The Researchers Forum is a new vehicle that has been introduced in RCSI to seek the involvement of the research community in the shaping and actioning of the research strategy and the identification of new gaps and challenges that need to be addressed.

The Researchers Forum convenes quarterly to network, discuss issues related to research and facilitate communication between researchers, the RMT and the Research Committee. Specifically, the Researchers Forum aims to provide RCSI researchers with an opportunity to:

- Identify and discuss local and national issues relating to research staff.
- Offer ideas and recommendations to the Research Committee and Research Management Team on matters related to research.
- Develop ideas for initiatives that could benefit RCSI's research community.
- Provide a forum for the RMT and Research Committee to disseminate research-related information and to update Researchers on new developments.
- Provide a means for monitoring the implementation and benefits of new research initiatives.

Ultimately, RCSI aims to deliver an effective and inclusive research implementation plan that is realistic and reflects RCSI strengths and real potential for developments.

8. DELIVER AND DISSEMINATE IMPACTFUL RESEARCH

RCSI recognises the importance of delivering and disseminating impactful research and the main objectives of RCSI's strategy for research and innovation are set to deliver on this goal. To maximise impact, we will build on our current outreach and dissemination activities (Annex 4) to ensure that research outcomes are widely disseminated to the relevant audiences via appropriate methods and tools. We will stimulate the engagement of the general public in research which, in turn, will promote health awareness and higher health management standards. While dissemination will maximise research impact, RCSI's plan for dissemination and outreach will also provide useful feedback, foster new ideas and offer new competitive research development opportunities leading to new clinical applications or/and commercial exploitations.

Our commitment to the delivery of impactful research requires that we set the following objectives:

- To deliver training for researchers at all stages of their career on:
 - » How to deliver research impact (i.e. identification of end users and measures of impact);
 - » How to prepare an impactful research proposal, from the scientific, clinical, societal, educational, and health economic perspectives;
 - » How to disseminate research outputs effectively to different audiences, with different means of communications; and,
 - » How to plan a dissemination strategy that mutually benefits individual researchers and the institution.
- To deliver an institutional dissemination and outreach plan that reaches and promotes the engagement in research of:
 - » Primary school pupils through the 'Small Science, Big Ideas' initiative (described in Annex 4);
 - » Secondary school pupils, through visits to schools, presentations, transition year research projects, research summer camps, debates of science issues [<https://www.rcsi.ie/debatingscienceissues/>];
 - » Undergraduate students, through the research summer school programme, the select student component of third year, organisation of international research meetings (such as RCSI's award-winning international Conference for Healthcare and Medical Students) and participation in Erasmus programmes;
 - » Local communities and schools – through the organisation of health awareness events, open research days, and open lecture series (RCSI MiniMed Open Lecture Series);
 - » Patient advocacy groups and clinical staff, whose perspective and engagement can play a very important role in the planning and implementation of clinical studies;
 - » Industry - through the promotion of researchers' participation in industrial-oriented events (exhibitions, conferences, etc.), and industry engagement in research programmes and events (e.g. Research Day, research interaction workshops, research summer school);
 - » Scientific communities – incentivising attendance of RCSI researchers as delegates and keynote speakers at international scientific meetings;

RCSI will disseminate its impactful research through publications and a variety of outreach programmes to the public

- » General public – encouraging RCSI researchers to disseminate their research through public media channels (including newspapers, TV, radio and social media) and become visible contributors to public debate on scientific issues; and,
 - » Developing countries – to promote humanitarian research initiatives in developing countries that raise health awareness and health management standards.
- To review the implementation of this strategic plan for research and innovation to ensure that it delivers impact, and monitor the following impact indicators:
 - » Peer-reviewed publications;
 - » Peer-reviewed publications co-authored by RCSI scientists and clinicians or industry partners;
 - » Authors' and publications' citation impact;
 - » Clinical studies;
 - » RCSI-led collaborative funding awards;
 - » Collaborative projects with industry partners;
 - » PhD Theses;
 - » Oral presentations at international conferences;
 - » International research symposia hosted at RCSI; and,
 - » Public participation and number of new outreach initiatives.

We will review these and other research outputs annually and we will undertake internal and external institutional research reviews every second year.



9. ANNEXES

1. RCSI STRATEGIC PARTNERSHIPS

National partnerships

RCSI-led national strategic partnerships with other medical and educational institutions, founded on peer-reviewed research programmes include:

- The strategic research partnership with Dublin City University (DCU), Maynooth University under the 3U Partnership Initiative [<http://www.3upartnership.ie/research/3u-research>]. By providing a convergent forum for complementary expertise from three institutions, the 3U Partnership catalyses research and innovation across a range of key areas of importance to society.
- The HRB Centre for Primary Care Research [<http://www.hrbcentreprimarycare.ie>] is a multidisciplinary collaboration between RCSI (lead), TCD and Queen's University Belfast. The Centre is researching the quality of care across the primary/secondary care interface in vulnerable patient groups and developing information and communication technology (ICT) interventions to improve patient care. The HRB Centre has developed a critical mass of young, motivated academics from a multi-disciplinary background, employing over 45 people in a five-year period.
- The Perinatal Ireland Initiative [<http://www.perinatalireland.ie/>] funded by the HRB and led by RCSI, which comprises eight leading Irish fetal medicine centres, whose mission is to improve perinatal outcomes for mothers and babies using advanced ultrasound technologies (2007).
- The National Biophotonics & Imaging Platform of Ireland [www.nbipireland.ie] (RCSI coordinator) funded by the HEA under PRTL cycle 4 (2007); NBIP has been successful in securing FP7 Marie Curie Co-funding to establish a Career Enhancement and Mobility

Programme [www.nbipireland.ie/education/cemp]. This programme supported research fellows undertaking interdisciplinary research and training programmes in biophotonics and imaging applied to cancer, cardiovascular and neurodegenerative diseases and has resulted in an international dimension through partnerships with the CNRS (Centre National de la Recherche Scientifique) Montpellier (France), the CNR (Centro Nazionale delle Ricerche) Institute of Biostructure and Bioimaging, Naples (Italy) and The Nordic Imaging Network. NBIP Ireland is also a partner in the Eurobioimaging initiative [<http://www.eurobioimaging.eu>], which is currently being developed with EU funding as part of the ESFRI programme.

- The CHRAIC programme [www.chraic.org], a partnership including TCD, NUIG, six African countries and one non-governmental organisation, The Council for Health Research for Development [www.COURED.org] for capacity building for pro-poor health research in Africa.
- The partnership with the Children's Research Centre (CRC) at Our Lady's Children's Hospital, Crumlin (OLCHC) in childhood cancer (2006).

Collaborative research initiatives

RCSI is also a key partner in the following large collaborative research initiatives:

- The SFI-funded Advanced Materials and BioEngineering Research (AMBER) Centre [www.ambercentre.ie], that brings together two leading international research centres in bioengineering and nanotechnology from Ireland's leading university, Trinity College Dublin, the Trinity Centre for Bioengineering (TCBE) and Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN) in addition to the Tissue

Engineering Research Group based at RCSI, as well as researchers in materials chemistry from UCC. The aim of the centre is to deliver internationally leading materials research that will be industrially and clinically informed with outputs including new discoveries and devices. AMBER has an exceptionally strong emphasis on linking industry to research programmes and its goal is to become an internationally recognised centre of excellence for materials – based in Ireland.

- The Dublin Molecular Medicine Centre (DMMC), a Dublin-based research partnership with UCD and TCD, which evolved into Molecular Medicine Ireland (MMI) [www.molecularmedicineireland.ie] in 2008, to include UCC and NUIG.
- The Dublin Centre for Clinical Research (DCCR), a Dublin-based infrastructure funded by the HRB and the Wellcome Trust, involving, initially, TCD, UCD and RCSI and later, NUIG and UCC Medical Schools and associated teaching hospitals, which provide space, facilities and trained staff to support collaborative clinical research studies across Ireland (2008). The CRC is one of the Irish clinical research facilities funded under the DCCR programme and, within it, plays a leading role in the development of a shared clinical research informatics network and the training and education programmes for research nurses.
- The SFI-funded INFANT Research Centre [www.infantcentre.ie] whose aim is to strengthen the pipeline of delivery in diagnostics, devices and monitoring solutions for adverse pregnancy and neonatal outcome.
- The Biomedical Diagnostic Initiative [www.bdi.ie] with DCU and industry partners, funded by SFI under the Centre for Science, Engineering and Technology (CSET) scheme which focuses on the development of biomedical diagnostic devices.
- The Molecular Therapeutic for Cancer Ireland Strategic Research Cluster [[http://](http://mtci.ie)

mtci.ie], with partner DCU, UCD, TCD, and ICORG, funded by SFI under the Strategic Research Cluster Scheme.

- The Irish Drug Delivery Research Network (IDDN) [<http://www.ucd.ie/iddn/>] with partner TCD, UCD, UCC, funded by SFI under the Strategic Research Cluster Scheme.
- The Irish Longitudinal Study on Ageing – TILDA [<http://www.tcd.ie/tilda>], funded by the HRB.
- The first, Irish Cancer Society-funded Collaborative Cancer Research Centre in Breast Cancer, BREAST-PREDICT [www.breastpredict.com]. BREAST-PREDICT brings together researchers UCD, TCD, RCSI, DCU, NUIG and UCC, and the clinical trials group, ICORG. Its mission is to improve the understanding of how breast cancer spreads and becomes resistant to treatment, and develop better therapies.

International partnerships

Internationally, RCSI co-ordinates three FP7 Marie Curie Industry-Academia Partnerships and Pathways projects (OXY-SENSE, AngioTox and Endo Predict), four FP7 collaborative projects (Apo-Decide, AngioPredict, AMCARE, EpiMiRNA), and two FP7 COST actions (COST-Africa and Metallo Drug Design and Action). RCSI also leads the Community Systems Strengthening for Equitable Maternal and Child Health Programme [<http://cosystemnch.org/>] with partners DCU and Concern Worldwide, which is funded by the HEA and Irish Aid and is based in Zambia and Malawi.

RCSI is also partner in 10 FP7 projects (UMPIRE, LiveCity, EU-GEI, ORCAB, APO-SYS, EpiPGX, SYS-MEL, WELCOME, VISICORT, MERCURIC) and the European Vaccine Initiative. In order to enhance the quality of training and promote mobility of researchers, RCSI has also signed co-tutelle Ph.D. agreements with the Universities of Montpellier and Naples.

2. PROCESS FOR THE ESTABLISHMENT OF RESEARCH CENTRES

Complex biomedical problems often require an interdisciplinary approach in order to be successfully addressed. To address this need, RCSI will seek to establish interdisciplinary research centres of excellence. The establishment of such centres will provide focus, further develop institutional strengths and increase the visibility of RCSI research. Such centres will also assist with keeping RCSI research strategy aligned with national and international funding strategies and will make RCSI more competitive for funding under the SFI Research Centres and other national and international funding schemes.

Criteria for establishment of a Research Centre:

- Centre should have clearly defined scientific focus and mission.
- Centre membership should be multidisciplinary in nature and ideally include clinicians.
- Centre membership should represent a critical mass of multidisciplinary expertise that is demonstrated by a substantial record of quality research productivity, including high impact publications and funding awards.
- Where possible, depending on the research field, Centres should be able to attract industry support.

Proposals for the establishment of new Centres will be subject to the review process outlined below.

It is expected that new Centres will meet all the criteria above, will deliver societal and scientific benefits, have a realistic and measurable five-year development and sustainability plan and can offer training and development opportunities to Early Stage Researchers (ESRs). Research Centres will be required to report annually and will be subject to audit.

The activities and responsibilities of Research Centres:

- Disseminate the outcomes of research internally and externally
- Supervise and provide full training support for research students
- Provide mentoring and other support for relatively inexperienced supervisors
- Organise regular series of research seminars with external participants
- Organise one-day symposia at the College
- Attract externally funded research students
- Attract Visiting Research Fellows and Visiting Professors
- Build a national and international profile
- Establish and enhance links with external bodies
- Attract significant internal and external funds and make a financial contribution
- Encourage other staff in the area to become research-active

Review process of proposals for research centre status

- Consultation with the ORI (available on request)
- Submission of the proposal to the ORI
- ORI review and preselection of proposal(s) that meets the eligibility criteria and are submitted to the Research Committee for review and feedback
- ORI feedback to applicants of unsuccessful proposal
- Senior Management Team (SMT) review of proposals that received RC positive feedback and approval of the establishment of new Centres.
- General announcement of the establishment new centre

3. RCSI STRATEGY FOR HORIZON 2020 AND OTHER FUNDING PROGRAMMES

RCSI wishes to capitalise upon its success in FP7 by setting up a proactive Institutional Strategic Approach for Horizon 2020 (ISA H2020). The objective is to identify and support near-term, high-potential opportunities and to develop future high-potential opportunities over the medium and long-term. We wish to develop our international research networks and to use EU programmes to build upon our current strengths as well as to address current and future gaps.

Benefits of this ISA are that:

- Researchers are: (a) informed well and in advance about relevant funding opportunities; (b) learn to develop a long-term planning and reviewing approach to research and grant applications; (c) have the tools and advice required to assess whether their plans are realistic and sustainable and to identify ways and means required to enhance their competitiveness; (d) have the training and support required to prepare competitive proposals; (e) are motivated and incentivised.
- RCSI puts in place a support mechanism that: (a) builds on existing institutional research strengths (expertise, networks, projects, supervisory excellence and excellent track records of researchers etc.); (b) is proactive rather than reactive to funding calls; (c) is measured and justified in terms of financial and human resources; (d) is based on planning and regular reviews and annual action plans that can be adjusted to address unplanned changes in the national and international funding landscape; (e) through alignment with RCSI research and academic recruitment strategy, will enhance its chances of success in EU (and national) funding awards and strengthen RCSI's academic and research profile.

The ISA H2020 is being developed in six overlapping stages:

- Preparatory work for strategy: The Office of Research and Innovation (ORI), in conjunction with external consultants and an internal advisory board, designed a strategy for RCSI to optimise its participation in H2020. The scope of the exercise, the initial level of support provided by RCSI (including consultants), contributors to the exercise; a roll out plan, a communication plan, and an initial budget were all described. The strategy and its associated documents and tools are under continued review to ensure optimal responsiveness to changes in the H2020 programme and researchers' needs.
- Immediate support for researchers applying for 2014 calls: Researchers were provided with information on H2020 and asked to express their intentions with regard to applying for funding. Where a near-term interest was expressed a pre-proposal template was supplied to the researcher to help capture information aimed at gauging their level of readiness to apply for H2020 funding and their support and training needs. One-to-one clinics were arranged with national contact points and external consultants as required. Lessons learned and all resources developed during this initial phase are being fed into on-going ISA H2020 activities. Where a researcher is deemed to be advanced enough to apply to a pending call, they receive one-to-one feedback from the consultants, targeted training, a proposal management toolkit, an annotated proposal template, and advice on the selection of a consultant to assist with proposal preparation. Where a researcher is deemed not

to be sufficiently advanced with their proposal planning they receive feedback from the consultants who will work with them and RCSI's ORI to develop them to the point where they are competitive in the short, medium or long-term, depending on the individual case.

- Evaluation exercise: we will review RCSI current strengths (competitive networks, programmes, researchers). Researchers will also be encouraged to develop a personal strategy towards winning research funding. They will receive a 'toolkit' which, with the support of the consultants, they can use to carry out a self-assessment and develop a holistic strategy for realistically targeting research funding (not limited to H2020 funding). ORI will produce a report which identifies institutional strengths, weaknesses and any supports needed with regard to H2020 and more widely.
- Development of institutional strategic plan and specific annual action plan: On completion of the evaluation we will draw up an overall plan, RCSI's Institutional Strategic Approach to H2020 (ISA H2020), covering the period 2014-2020. Aligned to RCSI's research and institutional strategies, this will provide a long-term plan for the support of researchers in making successful, strategic bids to H2020.

It will enable a consistent approach to H2020, build on previous success and focus efforts to develop areas that are lagging behind. RCSI's ISA H2020 will incorporate the evaluation exercise and encourage proactive, meaningful planning. It will identify key implementation resources and actions in terms of support, management and oversight. ISA H2020 will also set institutional targets and will include a review programme. Each year an annual action plan will identify priorities for support, planned submissions and key indicators. It will also describe training and support actions and indicate the yearly resource allocation.

- Implementation of annual action plans followed by annual review: Each annual plan will be approved in advance by the SMT and the RC. Each annual review will inform the plan for the following year.
- ISA H2020 reviews: The initial plan will be reviewed and approved (in order) by ORI, RC and SMT. ISA H2020 will include review schedule, tools, and metrics of success. We propose to review the overall strategic plan after two to three years (strategy mid-term review), to see if changes are necessary or desired. National Contact Points and external advisors will be involved in the reviews.

4. EXAMPLES OF ONGOING OUTREACH INITIATIVES

Examples of RCSI outreach activities include:

Small Science, Big Ideas initiative

Senior researchers and post-docs visit a minimum of one primary school (visiting approx. 90 children) each academic year to deliver workshops designed specifically for younger children, introducing them to ways scientists work and allowing them to conduct simple experiments.

Debating Science Issues

REMEDI DSI - Debating Science Issues is a dynamic debating competition which invites young people to engage in debate on the cultural, societal and ethical implications of advances in biomedical science. Open to students in the senior cycle of secondary school in the Republic of Ireland and Northern Ireland, the competition aims to:

- Encourage young people to take an active interest in biomedical science and to engage with contemporary research.
- Facilitate discussion amongst young people on the advances in the biomedical field and the societal and ethical impact of this research.
- Stimulate young people to think differently about biomedical science, as they discover the immense impact it has on society and to consider a career or education in this field.
- Expose students and teachers not normally involved in the traditional sciences to the area of biomedical science.
- Generate awareness of biomedical research within the broader school community.

Participating schools have the opportunity to avail of a three-hour interactive student workshop on biomedical science. For more information visit: <https://www.rcsi.ie/debatingscienceissues>

Annual ICHAMS conference

RCSI's award winning International Conference for Healthcare and Medical Students (ICHAMS), is aimed at undergraduate students and run by undergraduate students. This annual event attracts delegates from all over the world and not only gives students the opportunity to present their research findings in an international setting and have their abstracts published, but also educates them on the general importance of research in the broader medical fields and provides career information on specific research topics they might want to pursue, both at home and abroad. The conference includes interactive workshops for participants and renowned keynote speakers. To date, participating countries have included the United Kingdom, North America, Europe, Turkey, Iran, Sri Lanka, the Ivory Coast, the Philippines, and the United Arab Emirates.

RCSI MiniMed Open Lecture Series

This annual series of informative public health lectures are open and free of charge to the public. Disease prevention, treatments and the latest advances in health and medical research are explored by some of the Ireland's leading healthcare experts across a broad range of topics including cancer, diabetes, heart disease, stroke, diseases of thyroid and sports emergencies. Programme details and registration are available on RCSI's website at www.rcsi.ie/minimed

Health research in Africa

Professors Kevin McGuigan from the Department of Physiology and Medical Physics, Ruairi Brugha from the Division of Population and Health Sciences and Sam McConkey from the Department of International Health and Tropical Medicine are engaged in multiple programmes to improve the public health and basic education within several regions in Africa. These include establishing and evaluating a national malaria surveillance system in the Gambia, research into HIV and research into hepatitis C. Further information on the projects and research being carried out is available from the Division of Population and Health Sciences and the Department of International Health & Tropical Medicine.

5. GLOSSARY OF ACRONYMS

AMBER	Advanced Materials and BioEngineering Research	IPE	Inter-professional education
BICC	BEME international collaborating centre	INFANT	Irish Centre for Fetal and Neonatal Translational Research
BEME	Best Evidence Medical Education	IDDN	Irish Drug Delivery Research Network
BioAT	BioAnalysis and Therapeutics	IRC	Irish Research Council
BCSS	Biostatistical Consulting and Support Service	KETs	Key enabling technologies
CEMP	Career Enhancement and Mobility Programme	LEITs	Leadership in enabling and industrial technologies
CPHHSR	Centre for Population Health and Health Services Research	MRCG	Medical Research Charities Group
CRANN	Centre for Research on Adaptive Nanostructures and Nanodevices	MUB	Medical University of Bahrain
CSET	Centre for Science, Engineering and Technology	MMI	Molecular Medicine Ireland
CSM	Centre for Systems Medicine	NMIP	National Biophotonics & Imaging Platform of Ireland
CRC	Children's Research Centre	NRPE	National Research Prioritisation Exercise
CNR	Centro Nazionale delle Ricerche	NUI	National University of Ireland
CNRS	Centre National de la Recherche Scientifique	ORI	Office of Research & Innovation
HR	Department of Human Resources	OLCHC	Our Lady's Children's Hospital, Crumlin
DoR	Director of Research	PHHSR	Population Health and Health Service Research
DCCR	Dublin Centre for Clinical Research	PHS	Population Health Sciences
DCU	Dublin City University	PCRS	Primary Care Reimbursement Services
DMMC	Dublin Molecular Medicine Centre	PI	Principal Investigator
ERC	Education Research Centre or European Research Council	PRTL	Programme for Research in Third Level Institutions
EI	Enterprise Ireland	RCTs	Randomised Controlled Trials
EID	European Industrial Doctorates	RISE	Research & Innovation Staff Exchange
ERC	European Research Council	RC	Research Committee
GUI	Growing Up in Ireland	RMT	Research Management Team
HPE	Health Professions Education	RCSI	Royal College of Surgeons in Ireland
HPEC	Health Professions Education Centre	SPGS	School of Postgraduate Studies
HRB	Health Research Board	SFI	Science Foundation Ireland
HEI	Higher Education Institute	SRO	Senior Research Officers
HIPE	Hospital Inpatient Enquiry	SMEs	Small and medium-sized enterprises
HRS4R	HR Strategy for Researchers initiative	SPHeRE	SPHeRE (Structured Population and Health-services Research Education)
ICT	Information and communication technology	SRC	Strategic Research Clusters
ITN	Innovative Training Network	TeL	Technology-enhanced Learning
ISA	Institutional Strategic Approach	TILDA	The Irish Longitudinal Study on Ageing
ISA H2020	Institutional Strategic Approach for Horizon 2020	TCBE	Trinity Centre for Bioengineering

RCSI Royal College of Surgeons in Ireland
Coláiste Ríoga na Máinleá in Éirinn
121 St Stephen's Green, Dublin 2
Tel: +353 1 402 2550
Email: researchadministration@rcsi.ie
www.rcsi.ie