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Principal Investigator Impact
Research in Medical Devices

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PRINCIPAL INVESTIGATOR INSIGHTS ON RESEARCH IMPACT

SUMMARY FINDINGS FROM A NATIONAL SURVEY

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PRINCIPAL INVESTIGATOR INSIGHTS ON RESEARCH IMPACT

Summary findings from a national survey of principal investigators (PIs) of Irish-funded research and their views on creating and demonstrating impact from their research

This summary report was developed by the Principal Investigator Impact: Research in Medical Devices Project Team, supported by CÚRAM SFI Research Centre for Medical Devices

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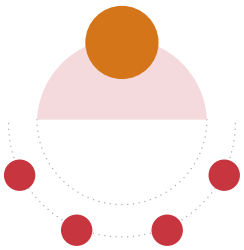
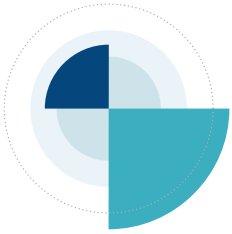
PRINCIPAL INVESTIGATORS: WHAT DO WE KNOW?

The combination of career expectations and ambitions of third level institutions and public research organisations to continuously increase research and grant income has resulted in a growth in the numbers of researchers taking on the principal investigator role. The principal investigator *is the person charged with direct responsibility for completion of a funded project, directing the research and reporting directly to the funding agency*[1].



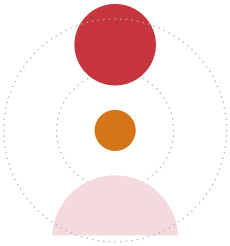
Leadership

Traditionally the PI role has been focused on scientific leadership. However, these role responsibilities have evolved and grown to encompass other roles such as *research allocator and controller, innovation facilitator, boundary spanner and project coordinator and manager*.[2] The change in role expectations means that PIs must adopt four role identities: science networker, project manager, entrepreneur and research contractor.[3] This in turn means the researcher in the principal investigator role has to collaborate with an array of stakeholders in order to realise impact beyond academia.



Collaboration

The growing body of research that has focused on researchers in the PI role highlights that they are linchpins in the advancement and transformation of knowledge,[4] they have a clear vision, are consistently strategizing, are open to all forms of collaboration and adopt a proactive posture in shaping scientific avenues.[5]



Knowledge Generation

Researchers in the PI role are motivated by the prioritization of new knowledge and face managerial challenges in the role[6], particularly project management, project adaptability and managing technology and knowledge transfer activities.[7]

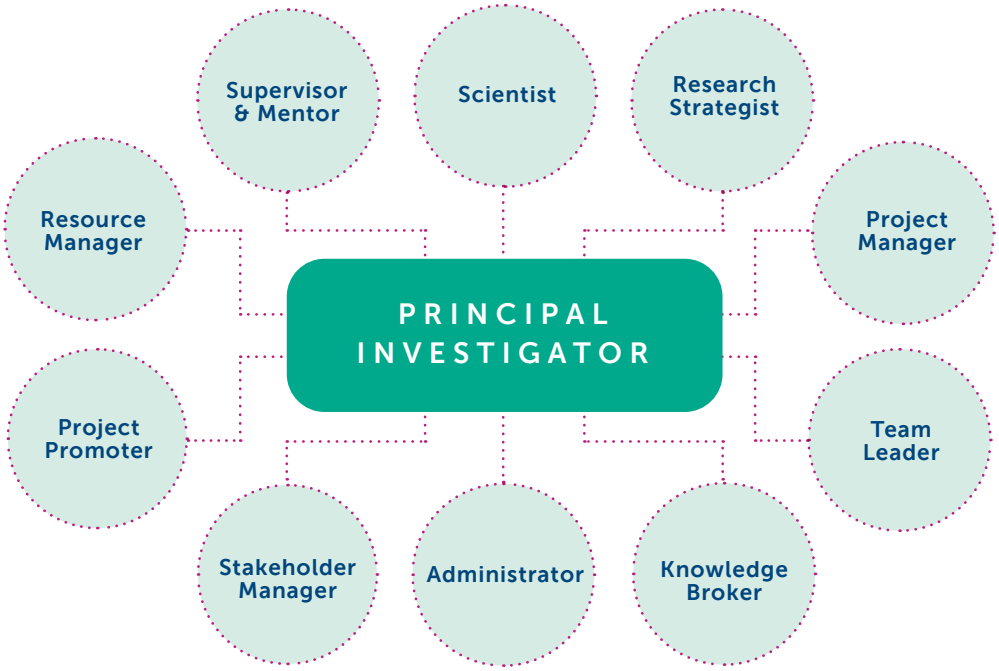
In the PI role, researchers need to be adept at conceptualising and creating value for different stakeholders[8] and be able to manage complex governance arrangements.[9] PIs learn on the job, accumulate role practices, with some researchers having more prior commercial experience than others.[10]

Role responsibilities and tasks

Being a member of dedicated research centres or institutes can provide PIs with much needed support in relation to realizing wider impacts.[11] This can support PIs in the activities that are designed to have an impact on society and overcome or manage the challenges they experience with respect to technology transfer and commercialisation.[12] Moreover, the lack of university support and resources confidence and consistency of funding organisations[13] can be barriers to technology and knowledge transfer.

For PIs who collaborate with SMEs, personal relationships, assets and proximity can be barriers or enablers to commercialisation.[14] Against this backdrop it is clear that there exists a constant and pressing challenge researchers must face in the PI role in planning for and realizing impact.

Principal Investigator Roles



[2]*Adapted from Cunningham et al, (2016) Publicly Funded Principal Investigators as Transformative Agents of Public Sector Entrepreneurship, in (ed)David Audretsch and Albert N. Link, Essays in Public Sector Entrepreneurship, Springer, pp.67-93*

SURVEY PURPOSE AND OVERVIEW

The purpose of our survey, conducted by members of the PI Impact project team, was to gain insights into the impact experiences and challenges of scientists and researchers that held the principal investigator role on Irish-funded research projects. The Principal Investigator Impact Survey was administered between September and November 2020. This report presents a high-level overview of initial findings from the survey, with further findings and results to be disseminated through various academic and non-academic channels in the future.

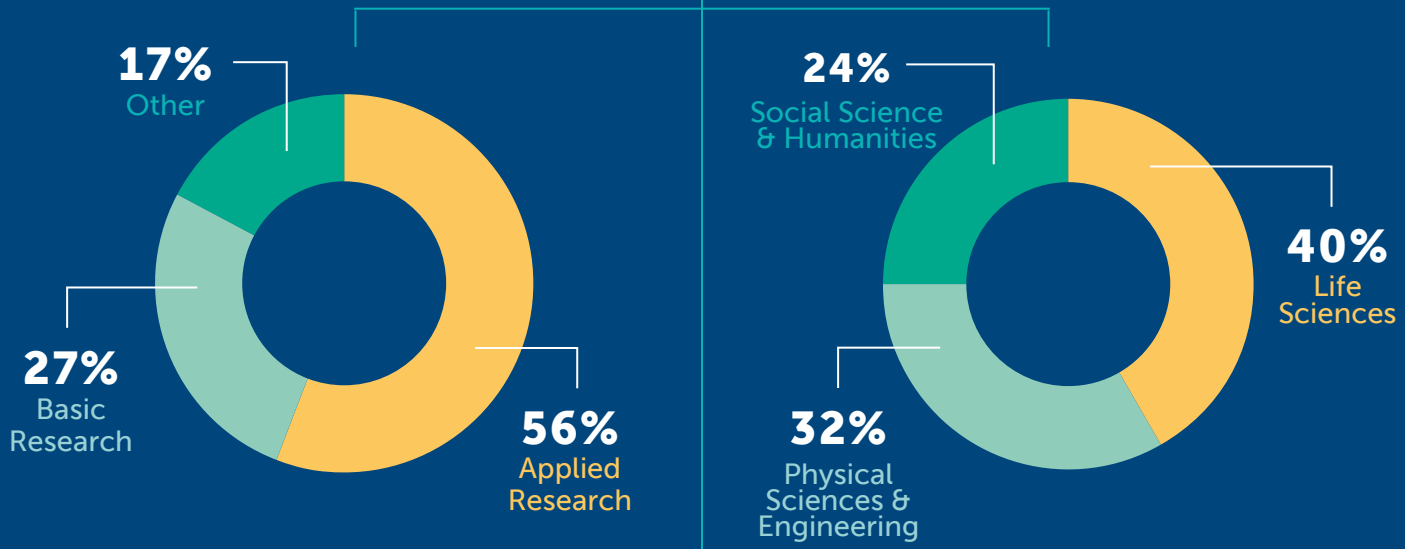
1303 principal investigators from 2015 to 2020 were identified and contacted to take part in the study, identified through the following funding bodies and schemes:

- Council for Forest Research and Development, Ireland (CoFord)
- Department of Justice and Equality
- Environmental Protection Agency, Ireland
- European Research Council
- Food Institutional Research Measure (FIRM)
- Horizon 2020
- Health Research Board
- Irish Research Council
- Marine Institute
- National Council for Curriculum and Assessment (NCCA)
- Royal Irish Academy
- Research Stimulus Fund
- Safefood Ireland
- Sustainable Energy Authority of Ireland (SEAI)
- Science Foundation Ireland

DEMOGRAPHICS

595
PI RESPONDENTS
(Principal Investigators of Irish-funded research)

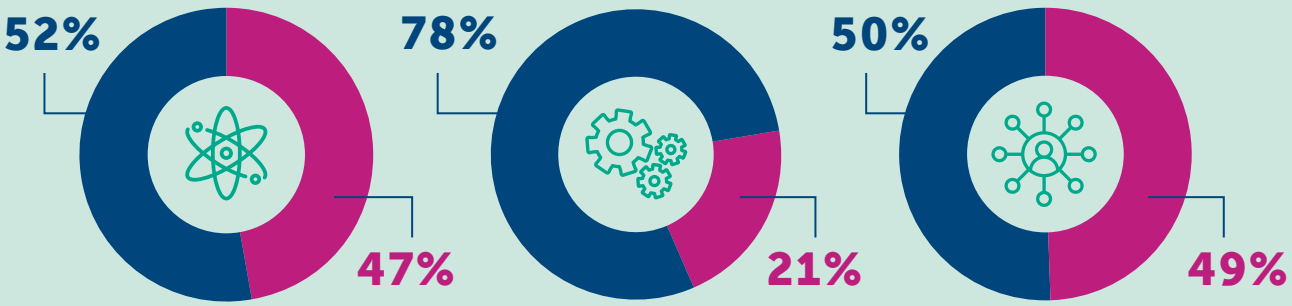
Disciplinary Background



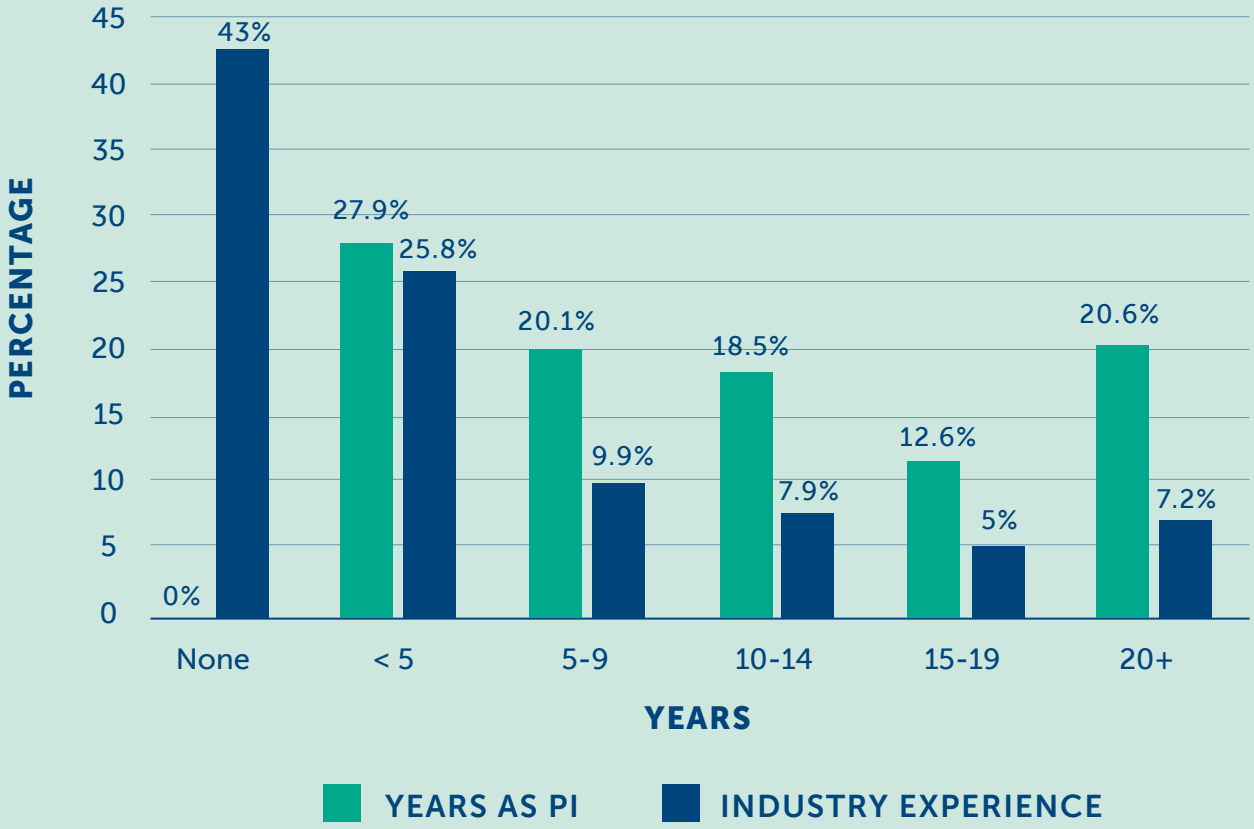
Gender Breakdown

59%
MALE

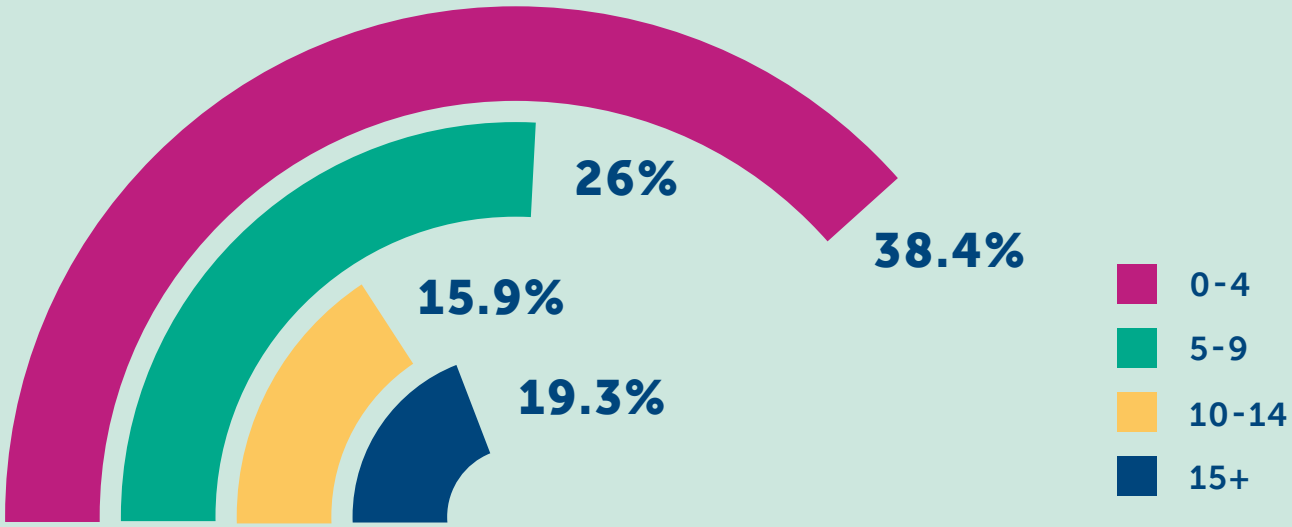
40%
FEMALE



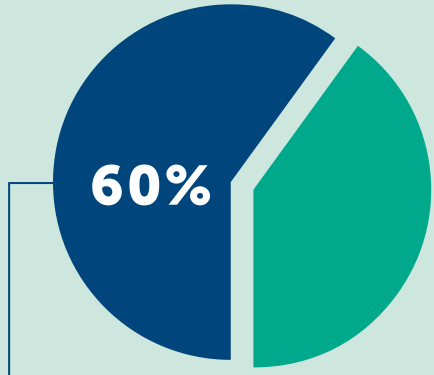
Experience



NUMBER OF PROJECTS AS PI



COMMERCIALISATION EXPERIENCE



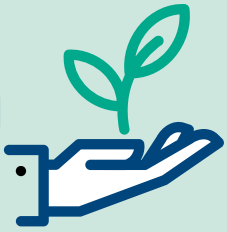
No previous commercialisation experience

21% Applied for a patent

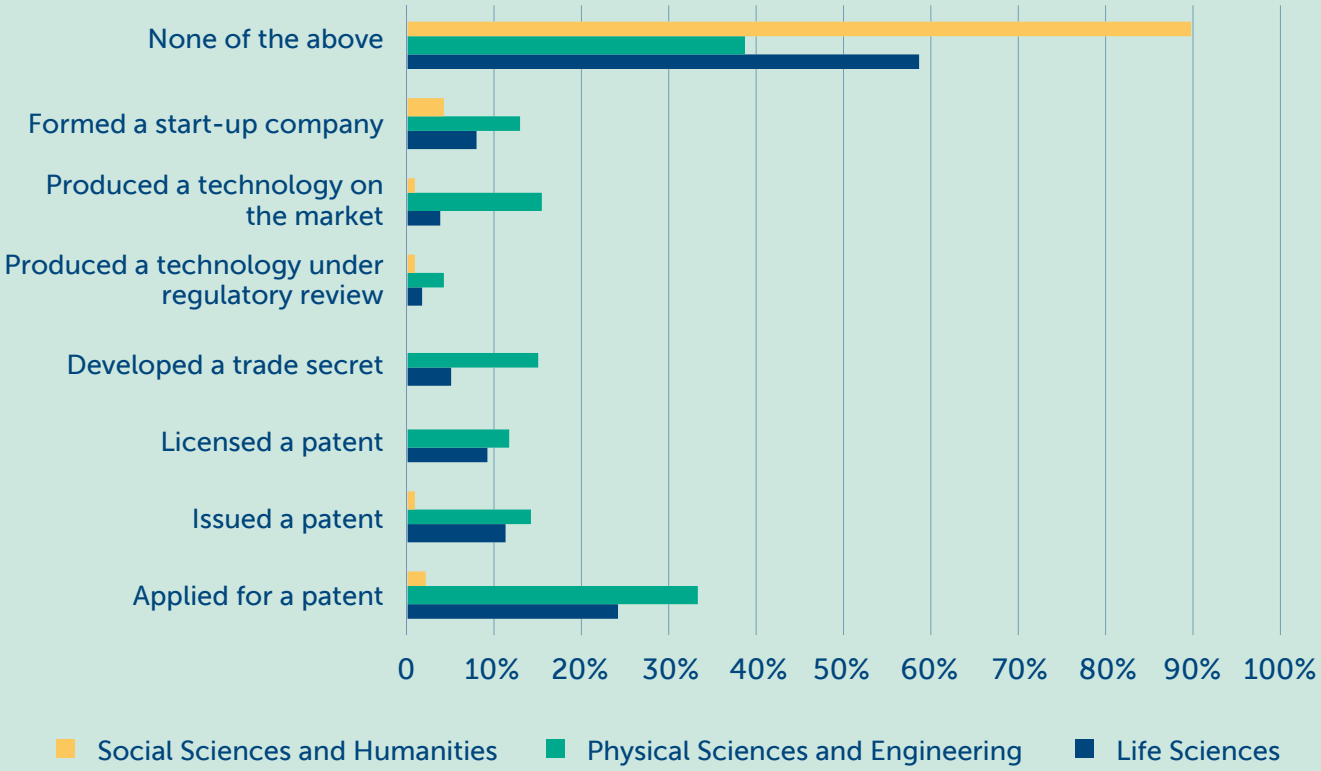
9% Issued a patent

8% Licensed a patent

9% Formed a start-up company

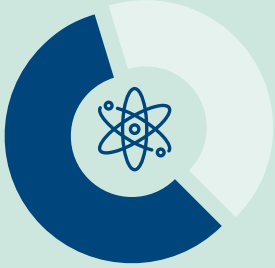


TECHNOLOGY TRANSFER ACTIVITIES



90% of Social Science and Humanities PIs had no Technology Transfer experience. Compare to:

38% of Physical Sciences and Engineering



58% of Life Sciences

PI PERSPECTIVES ON IMPACT

Top 3 types of impact* that PIs felt their research have contributed to:

1

KNOWLEDGE FORMATION, TRAINING AND CAPACITY BUILDING

2

UNDERSTANDING OF IDEAS AND REALITY, VALUES AND BELIEFS

3

INFLUENCING POLICY

Lowest rated type of impact:

MANAGEMENT OF THE ENVIRONMENT (E.G. NATURAL RESOURCES, ENVIRONMENTAL POLLUTION, CLIMATE AND METEOROLOGY)

Difference between research domains only in third highest impact type:

LIFE SCIENCES:

Public health, life expectancy, prevention of illnesses and quality of life.

PHYSICAL SCIENCES AND ENGINEERING:

Management of the environment

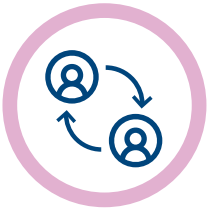
SOCIAL SCIENCES AND HUMANITIES:

Influencing policy

*Categories of impact based on European Science Foundation impact classifications (Reference: European Science Foundation (2012) 'The Challenges of Impact Assessment', Available at: http://archives.esf.org/coordinating-research/mo-fora/evaluation-of-publicly-funded-research.html)

TOP 3 MOST EFFECTIVE **INDICATORS OF IMPACT:**

HIGH IMPACT JOURNAL PAPERS



END-USER FEEDBACK OR ENGAGEMENT

POLICY CHANGES

	LIFE SCIENCES	PHYSICAL SCIENCES AND ENGINEERING	SOCIAL SCIENCES AND HUMANITIES
1	High impact journal paper	High impact journal paper	Policy changes
2	Citation count	Industry feedback or continued engagement	End-user feedback or engagement
3	End-user feedback or engagement	Citation count	High impact journal paper

TOP 3 MOST IMPORTANT **STAKEHOLDERS TO IMPACT POTENTIAL:**

ACADEMIC PARTNERS FROM EXTERNAL INSTITUTES OR OTHER UNIVERSITIES

FUNDERS

ACADEMIC PARTNERS FROM SIMILAR DISCIPLINES

	LIFE SCIENCES	PHYSICAL SCIENCES AND ENGINEERING	SOCIAL SCIENCES AND HUMANITIES
1	Academic partners from external institutes/other universities	Funders	Academic partners from external institutes/other universities
2	Academic partners from similar disciplines	Academic partners from external institutes/other universities	Academic partners from similar disciplines
3	Funders	Academic partners from similar disciplines	Funders

LIFE SCIENCES PIS PLACE MOST EMPHASIS ON **IMPORTANCE OF STAKEHOLDERS TO IMPACT POTENTIAL**

PERSPECTIVES ON FAILURE AND CRITICAL SETBACKS

PI Perspectives on failure

86%

agree that failures give opportunities for reflection and consideration

68%

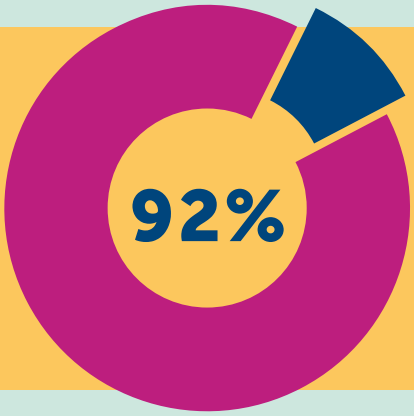
agree that failures generally lead to positive outcomes in the long run

Most common critical setbacks experienced by PIs

Problems with **finding necessary funding** for a new project

Problems **finding competent members** to join a project

Problems with **communicating with external stakeholders**



of PIs believe that the principal investigator role requires dedicated supports

Most common comments on types of dedicated supports required relate to:

Administrative burden

Budget and financial management

Staff recruitment and management

"Adequate admin support would help the PI to concentrate more on scientific work"

"PIs get little training. Once you secure a grant you suddenly need to be an scientist, a manager, an HR person, an accountant, an entrepreneur... on top of your other academic duties."

"Too much falls onto PI shoulders in terms of project, HR and financial administration."

"People management training... coaching post-docs and researchers is vital and urgently needed"

"The research process becomes more complicated all the time. Even the way impact is measured or assessed by funders changes regularly. It's crazy that we have no ongoing training, support or continuing professional development to help us to manage all of the additional components of being a PI."

OBSERVATIONS AND IMPLICATIONS

Some interesting observations can be raised from initial survey findings...

- Many common issues exist for PIs, across disciplinary background, gender, experience levels, etc
- Despite the majority of PIs working in applied fields, traditional categories of impact (e.g. knowledge generation, understanding of ideas) remain most prevalent in impact perspectives
- As such, findings would suggest that PIs are most confident dealing with traditional metrics of scientific impact (e.g. journal impact factors, citation counts) as effective indicators of impact
- PIs generally consider policy impact as an important and achievable form of impact, with PIs in social science and humanities disciplines emphasising this the most
- End-user feedback as an indicator of impact offers promise, but requires more exploration as to the nature and quality of this feedback
- PIs remain most comfortable and confident in collaboration with other academics to achieve impact
- PIs view failure as a valuable learning experience

In relation to medical device research...

Since 2015 the PI Impact project focus has been on PIs within the multidisciplinary field of medical device research. We have found that medical device PIs face similar challenges to those highlighted in this survey in terms of facilitators and barriers to impact. In addition to this, medical device research involves particularly long translation pathways from basic science to point of care application, including a multitude of regulatory and commercialisation hurdles to overcome, to bring medical devices to market and to ultimately impact patients' quality of life. Our research to date has highlighted how *medical device PIs are more comfortable engaging with industry and clinicians* than would appear evident from the survey findings presented above, with PIs in general more focused on traditional pathways to impact and more internally focused.

Furthermore, this research would indicate that medical device PIs need to be aware, in their multidisciplinary collaborations with other academics for impact, of the lack of external focus of many academics, as well as the general *lack of technology transfer experience* .

In contrast to many PIs, medical device PIs can be considered as *exemplary boundary spanners of academia-industry relationships*, in the emphasis they place on industry and clinician involvement for impact.[15] Furthermore, our research has found that collaborative research centres such as CÚRAM offer potential to support PIs of medical device research in brokerage, networking, collaboration and ultimately addressing impact in their research activities.[16] These areas will be explored in more detail and depth in future research outputs, including our White Paper on Preparing Scientist for the Principal Investigator Role and Impact in the Medical Device Sector. These materials are available for download at www.piimpact.com.

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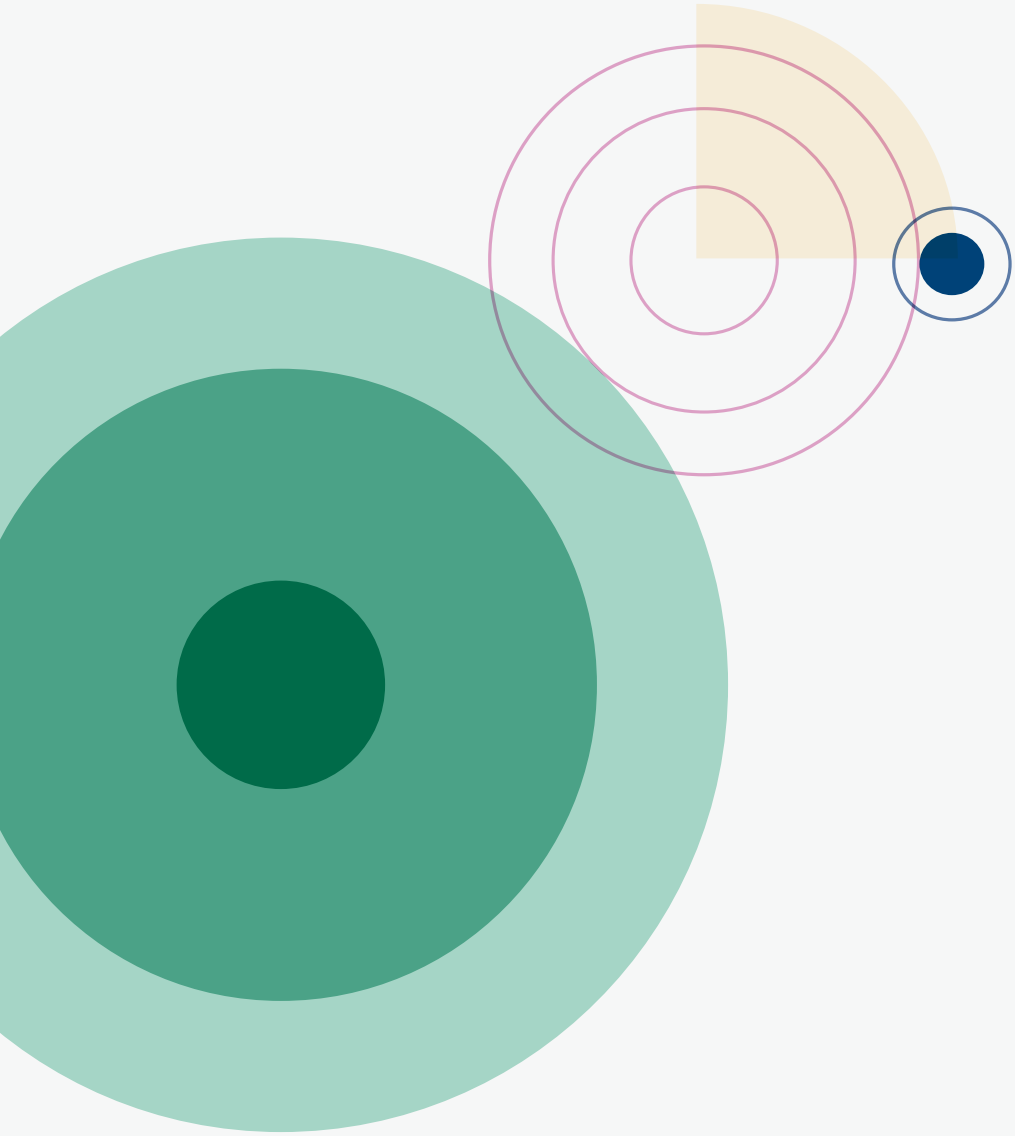

ABOUT THE PI IMPACT PROJECT

The Principal Investigator Impact: Research in Medical Devices Project, supported by CÚRAM SFI Research Centre for Medical Devices, brings a social scientific dimension to the theme of Impact and Impact Orientation in the field of Medical Device Research. Professor James Cunningham, the originator and initial PI of the project in 2014 when he was Director of the Whitaker Institute at NUI Galway, is a leading scholar on principal investigators, based on his expertise in strategic management, innovation and entrepreneurship. Professor Caroline McGregor is PI for the project and introduced the use of the Ecological Model. Dr Brendan Dolan is lead post doctoral researcher for the project and, through his doctoral studies, carried out the in-depth qualitative aspect of this study as well as designing and conducting the quantitative survey. Dr Emmet Fox provided essential support in survey administration and initial analysis of the survey results.

For more information on the project, and access to resources, tools, and learning materials on becoming a PI and planning for impact, please visit our website: www.piimpact.com