

The Royal Irish Academy, Ireland's leading body of experts in the sciences, humanities and social sciences, established a high-level steering group in May 2018 to consider the current adequacy and requirements of research infrastructures in Ireland against the context of Innovation 2020 and Ireland's overall national ambitions for research and higher education.

In its work, the steering group considered the following questions:

- Do researchers have access to adequate research infrastructures to support their work?
- What do researchers see as priority areas for investment?
- How can Ireland best future-proof its research infrastructures?

Phase I of the group's work saw the roll-out of a Research Infrastructures Survey. A pre-budget submission was issued based on the findings of the survey. In addition, a consultation workshop was held in June 2018. An overview of the results of the survey are outlined in this paper. A final report considering future needs and opportunities in respect of research infrastructures will issue in Autumn/Winter 2018.¹

¹ Further details about the RIA Research Infrastructures steering group and its work can be found at <https://www.ria.ie/programmes/policy-and-international-relations/research-infrastructures>. Details of the pre-budget submission and the outcome of the consultation workshop are available at: www.ria.ie/reports/policy-reports-0.

How do we define ‘research infrastructures’?

There are varying definitions of research infrastructures. This discussion will take a broad view of what a ‘research infrastructure’ is and will define it to include equipment, facilities (including library resources), buildings, research institutes, research support systems, virtual infrastructure and personnel. It will examine research infrastructures related to arts, humanities and social sciences (AHSS) disciplines as well as science, technology, engineering and mathematics (STEM) related infrastructures.

The definition that will be broadly applied is that of the Directorate-General for Research and Innovation of the European Commission:

‘research infrastructure’ means facilities, resources and related services that are used by the scientific community to conduct top-level research in their respective fields [and] covers major scientific equipment or sets of instruments; knowledge-based resources such as collections, archives or structures for scientific information; enabling Information and Communications Technology-based infrastructures such as Grid, computing, software and communications; or any other entity of a unique nature essential to achieve excellence in research. Such infrastructures may be ‘single-sited’ or ‘distributed’.²

² European Commission, ‘Research infrastructures and the regional dimension of the ERA’, Press release, 25 march 2009, Brussels; available at: http://europa.eu/rapid/press-release_MEMO-09-134_en.htm (28 September 2018).

Survey Overview

In May 2018, the Royal Irish Academy's steering group surveyed the members of the academic community on the island of Ireland to gather their views on the research infrastructures available to them in their respective institutions. The survey explored researchers' satisfaction with these infrastructures as well as future opportunities and needs in respect of research infrastructure provision, access and maintenance. The survey also invited respondents to provide suggested investment priorities to guide future allocations of public research infrastructural funding.

The survey was distributed widely to Royal Irish Academy members and stakeholders and to vice-presidents/directors of research in universities and institutes of technology in Ireland and Northern Ireland.

The survey attracted 238 responses across a broad institutional and disciplinary base: 38% of respondents identified as being from an AHSS background and 62% declared themselves to be from the STEM disciplines.

The survey results will be reported below as being responses from the AHSS or STEM disciplines, to reflect the somewhat varying concerns reported from each cohort. Nonetheless, as the results will show, there was a large amount of overlap in the issues reported by both sets of respondents.

Key findings

- **88%** of STEM respondents **‘strongly agree’** that research infrastructures are extremely important to their work. **79% of AHSS respondents state the same belief.**
- Slightly more than one-third of respondents in both discipline groups face obstacles in accessing the research infrastructures they require to conduct their research: **35% of STEM and 39% of AHSS respondents indicate that they are not generally able to access the research infrastructural resources they require.**
- **90% of STEM respondents answered that there are gaps/deficits in the availability of research infrastructures** relevant to their discipline. Common themes emerging from respondents’ comments included **lack of a sustainable model for routine maintenance and/or renewal of equipment; lack of investment in the human capital/personnel required to operate and/or maintain equipment;** and lack of dedicated funding for the continuous procurement of materials.
- **85% of AHSS respondents believe there are gaps/deficits in the availability of research infrastructures** relevant to their discipline. Common themes emerging from respondents’ comments include the existence of gaps in the collections of major Irish libraries, uneven access to subscription-based online resources, as well as a lack of travel funding to support research internationalisation activities.
- **77%** of STEM respondents believe that the research infrastructures available to them are **not adequately funded and maintained.**
- **72% of AHSS respondents** believe that the research infrastructures available to them are **not** adequately funded and maintained.
- STEM respondents are calling for future rounds of research infrastructural funding to prioritise:
 - An infrastructure **renewal funding** programme for routine laboratory equipment.
 - A research-building **modernisation** programme.

- **Basic infrastructure** for both research and teaching, such as improved IT facilities and laboratory equipment.
- **Improved core support** in the form of extra laboratory staff and technicians.
- AHSS respondents are calling for future rounds of research infrastructural funding to prioritise:
 - Greater access to **online databases**.
 - **Support for research internationalisation activities, including participation in/visits to international research facilities and networks**.
 - **Basic infrastructure** for both research and teaching.
 - Essential supports such as **IT and adequate facilities**.

Survey Results

The importance of research infrastructures

In order to assess the importance of research infrastructures to academics, respondents were asked to rate their level of agreement with the following statement:

Research infrastructures are extremely important to my work.

The responses overwhelmingly point to the significant importance of research infrastructures to researchers in the STEM and AHSS subjects.

STEM

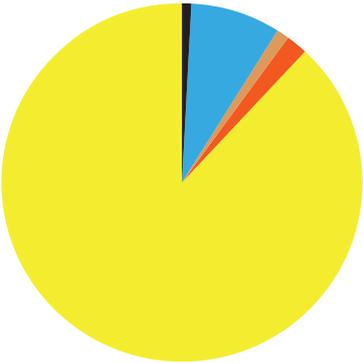
As illustrated in Fig. 1, 88% of the sciences respondents strongly agree with the statement, and a further 8% agree. Only 2% remain neutral and neither agree nor disagree with the statement, and a further 2% either disagree or strongly disagree, indicating that only 4% of STEM researchers surveyed are not strongly reliant on research infrastructures.

AHSS

Responses from the AHSS researchers (see Fig. 2) are similar to those of their STEM colleagues and indicate the strong importance of research infrastructures: 79% of respondents strongly agree with the statement; 20% agree; with just 1% neither agreeing nor disagreeing. Notably, no AHSS respondent disagreed with the statement.

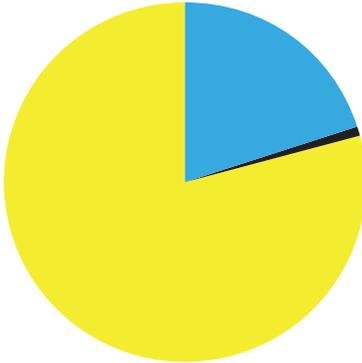
These results point to the need to provide and maintain adequate research infrastructures for all disciplines. Research infrastructures are an essential component of basic research as well as of applied research and must be funded as such. The survey results also highlight the importance of research infrastructures to AHSS colleagues, and there is a need to ensure that future funding is not solely focused on the sciences and on science research prioritisation areas.

Fig. 1: Importance of research infrastructures to STEM respondents



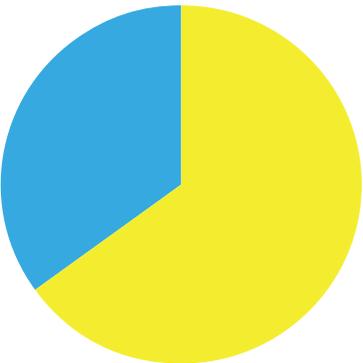
- Strongly Agree — 88%
- Agree — 8%
- Neither Agree nor Disagree — 2%
- Disagree — 1%
- Strongly Disagree — 1%

Fig. 2: Importance of research infrastructures to AHSS respondents



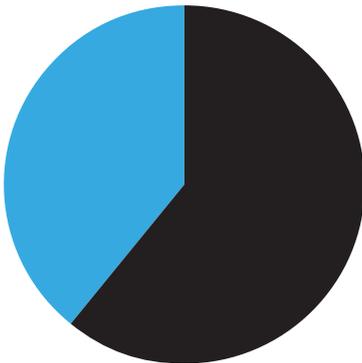
- Strongly Agree — 79%
- Agree — 20%
- Neither Agree nor Disagree — 1%

Fig. 3: Ability of STEM respondents to access required research infrastructural resources



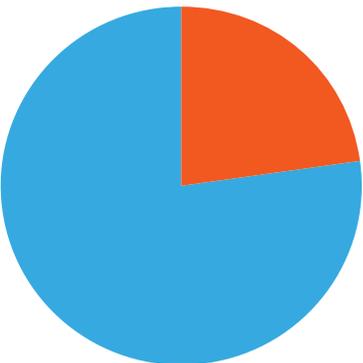
- Yes — 65%
- No — 35%

Fig. 4: Ability of AHSS respondents to access required research infrastructural resources



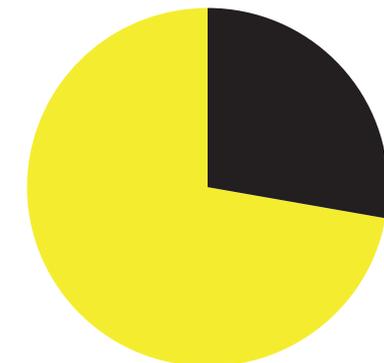
- No — 39%
- Yes — 61%

Fig. 5: Adequate funding for and maintenance of available STEM research infrastructures



- Yes — 23%
- No — 77%

Fig. 6: Adequate funding for and maintenance of available AHSS research infrastructures



- Yes — 28%
- No — 72%

Access to research infrastructures

The survey asked respondents to agree or disagree with the following statement:

Are you generally able to access the research infrastructural resources you require when working on a research project?

The key finding in response to this question is that slightly more than one-third of respondents in both disciplines face obstacles in accessing the research infrastructures they require to conduct their research.

STEM

Sixty-five per cent (65%) of STEM respondents (see Fig. 3) answered that ‘yes’, they do have access to the research infrastructures they require for their research projects. However, 35% answered ‘no’, they are not generally able to access such resources when working on a research project.

Of those who said they are able to access the infrastructures they need, many commented that they write proposals based only on what is available to them. Thus, the research they seek to do is limited by the research infrastructures already in place and to which they have access.

AHSS

Sixty-one per cent (61%) of AHSS respondents (Fig. 4) answered ‘yes’, they had good access to the research infrastructures necessary for their research. Again, however, over one-third (39%) answered ‘no’, indicating they do not consider they have good access to necessary research infrastructures, and as is the case for their STEM colleagues, qualitative responses from AHSS respondents indicate that many researchers constrain their proposals based on the infrastructures they have access to. This means that when such infrastructures are limited, then the capacity for research is automatically limited by default, and the types of project they propose are thus constrained by these limitations.

Research infrastructural requirements

In order to ascertain what types of research infrastructural requirements currently exist within the Irish research infrastructural landscape the survey asked:

Are there gaps/deficits in the research infrastructures relevant to your work/discipline which may be hindering the progression of research in this discipline?

STEM

Only 10% of STEM respondents replied that there are no gaps or deficits in the research infrastructures relevant to their discipline. All other respondents (90%) declared that there are such gaps, which are hindering research in their area:

the main gap is a sustainable model for government maintenance and renewal of the current infrastructure and new items. (STEM survey respondent)

The qualitative commentary on the issue of gaps in the system coalesces around a number of themes:

- Insufficient maintenance of equipment.
- Lack of staff to operate equipment.
- No sustainable model for renewal of equipment or for continuous procurement of materials.
- Insufficient time allowed for research.
- Funding uncertainties and delays.

The majority of respondents draw attention to the lack of maintenance and operating staff for many research infrastructures. Concerns are also expressed in relation to the difficulties in procuring new materials necessary for the operating of equipment, and attention is drawn to perceived neglect of much equipment.

There has been insufficient maintenance/replacement of equipment over the past 10 years since the bank crisis. For many basic lab pieces we are now way behind competitors in other countries. (STEM survey respondent)

A further common concern is that insufficient time is allowed for research, and this hinders the progression of projects. The need to provide more balance between teaching, administrative and research time also emerged as a prominent theme.

AHSS

Fifteen per cent (15%) of the AHSS respondents to the survey feel that their research is not being hindered by gaps in available research infrastructures. Among the 85% of respondents who do refer to gaps in the system, the following main themes emerge:

- Gaps in the collections of major Irish libraries.
- Lack of access to subscription-based online resources.
- Limited digitisation of National Library of Ireland and the National Archives of Ireland collections.
- Lack of travel funding to attend conferences and to view international collections.
- Lack of research time due to high teaching loads.

As noted, serious concerns are outlined regarding gaps in the research collections of major Irish libraries, with many respondents reporting difficulties in accessing the library resources they require. Concerns are also raised about insufficient investment in the digitisation of major national collections. Many respondents have concerns about access to subscription-based online resources. According to responses, online resource access varies between institutions and many respondents feel they cannot access vital resources that their colleagues in other institutions have access to. This is a prominent area of concern.

Other respondents report difficulties in acquiring travel funding to attend conferences and to view international collections. This appears to be an important issue in light of the previously noted difficulty regarding gaps in domestic library collections. If researchers cannot access the content they require in their home institutions, they need to travel to seek it. Unfortunately, this seems to be a difficult endeavour for many AHSS researchers due to funding restrictions.

Similarly to their STEM colleagues, AHSS researchers also report difficulties arising from a lack of time in which to undertake research, due to high teaching loads. A better balance needs to be struck concerning the workload of academics/researchers to allow them ample opportunity to progress their own research.

Research infrastructure maintenance

As noted earlier, the ongoing funding and maintenance of existing research infrastructures is a prominent concern.

Survey respondents were asked:

Are the research infrastructures available to you adequately funded and maintained?

STEM

Only 23% of STEM respondents (Fig. 5) believe that the research infrastructures available to them are adequately funded and maintained; 77% of respondents consider current research infrastructures to be inadequately funded and maintained.

AHSS

As do their STEM colleagues, AHSS respondents (Fig. 6) express a lot of dissatisfaction about issues of funding and maintenance of available infrastructures. Only 28% believe that the research infrastructures they use are adequately funded and maintained, with 72% saying that they are not.

This is an urgent issue for all disciplines and one that suggests the immediate need for remedial action to secure even the current levels of investment in, access to, and value placed on research infrastructure in Ireland, to enable Irish researchers to compete internationally.

Research infrastructural investment prioritisation

The National Development Plan 2018–2027 (part of the Project Ireland 2020 initiative) commits to holding a sixth cycle of PRTL investment.³ The concluding survey question invited respondents to indicate the areas they consider should be prioritised in future rounds of research infrastructural investment.⁴

STEM

The answers to this question revolved around a number of key themes:

- An infrastructure renewal funding programme for routine laboratory equipment.
- A research-building modernisation programme.
- Better basic infrastructure for both research and teaching, such as improved IT facilities.
- Increased core support, such as provision of laboratory staff and technicians.

³ Between 2000 and 2015, *Programmes for Research in Third-Level Institutions* (PRTL) awarded €1.2 billion in exchequer and private matching funding for buildings, research centres, research equipment, research programmes and training (in particular structured PhD programmes).

⁴ The relevant survey statement and related question posed was: *Government has indicated that PRTL round 6 is envisioned but no dates have been set. In your opinion, what are the areas of research infrastructure investment that should be prioritised in this round?*

Unsurprisingly, respondents point to the need for a broad-based infrastructure renewal funding programme for many routine items of laboratory equipment. Establishing such a funding programme would potentially offset some of the maintenance issues highlighted in the responses to the previous question. Respondents also expressed a need for a research building modernisation programme.

There is a major need for a broad-based infrastructure renewal funding programme for many routine laboratory items of equipment. A research building modernisation programme also needs to be undertaken after such a prolonged period without capital investment into the sector. (STEM survey respondent)

A key concern is the need for better provision of basic infrastructure for both research and teaching. One respondent notes:

there has been no investment in basic infrastructure for a decade. Most of what is here needs to be replaced, before we even think about adding new infrastructure. (STEM survey respondent)

The survey paints a somewhat bleak picture in respect of the current adequacy of national research infrastructures.

Furthermore, the lack of core supports—such as staff, data managers, facilities, research assistants—emerges as an issue for many researchers. A number of respondents also called for a full ‘infrastructure audit’ to be undertaken by government to ensure all future investment is strategic and fulfils priority requirements.

AHSS

Respondents from AHSS research backgrounds highlighted the following priorities:

- Greater access to online databases.
- Availability of travel funding.
- Provision of basic infrastructure for both research and teaching.
- Provision of adequate facilities and essential supports, such as IT.

As illustrated by this list, greater access to online databases and the issue of travel funding are the priority issues for AHSS researchers.

Again, their responses mirror those of their STEM colleagues in terms of strong calls for better provision of basic infrastructure and adequate facilities for both research and teaching, and essential supports such as IT.

It is essential that any future research infrastructure funding, whether through a future round of PRTLII or some other mechanism, give sufficient weighting to the infrastructural needs of researchers in the AHSS disciplines.

Further information

The Royal Irish Academy/Acadamh Ríoga na hÉireann is Ireland's leading body of experts in the sciences, humanities and social sciences. The Academy champions research and identifies and recognises Ireland's world class researchers. It supports scholarship and promotes awareness of how science and the humanities enrich our lives and benefit society. Membership of the Academy is by election and is considered the highest Academic honour in Ireland.

The Academy is the only pan-island higher education institution in Ireland with a specific north-south remit and it offers a trusted, safe forum for cross-border discussions amongst leaders in higher education and research.

The Royal Irish Academy Research Infrastructures Steering Group would like to express gratitude to survey respondents and to all of those who helped to distribute the survey widely.

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