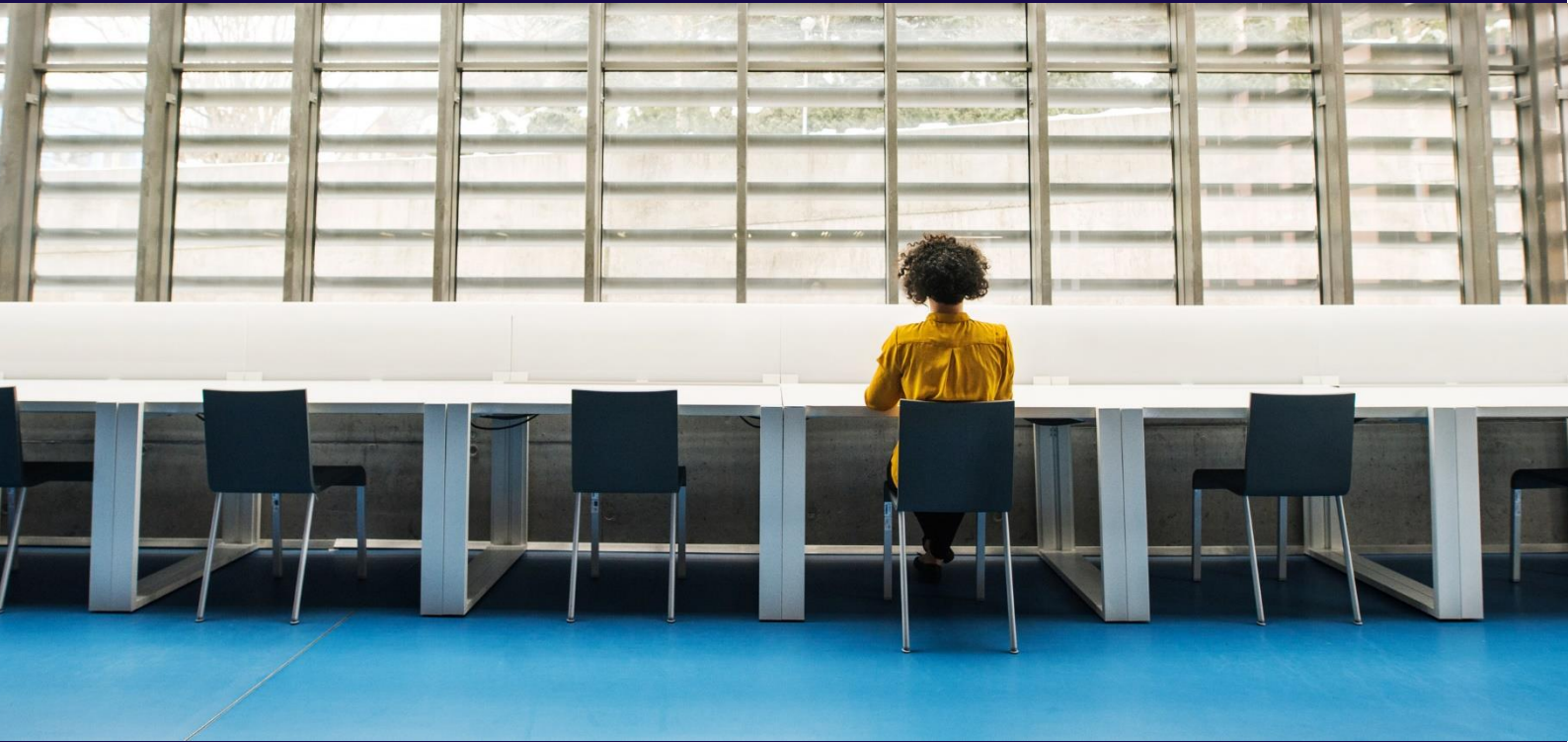




Emerging from uncertainty

How universities can underpin a research-led recovery from COVID-19

Summary Report

Commissioned by Springer Nature

October 2020

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Contact:

Dan Penny & Harald Wirsching

d.penny@nature.com

harald.wirsching@springer.com

Report authors:

Mattia Fosci, Lucia Loffreda, Andrea Chiarelli, Dan
King, Ian Carter, Mark Hochman, Rob Johnson

www.research-consulting.com

Contact:

rob.johnson@research-consulting.com

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1. Introduction

Research: the pandemic's hidden casualty

Research is at risk even as the world looks to it for answers

The coronavirus pandemic has caused profound economic and social disruption across the world. University research is not immune to these changes, and its future is under threat at a moment when investing in science has never been more important. Commissioned by Springer Nature, this report examines the current and possible long-term impacts of COVID-19 on research, and the priorities for a research-led recovery. It is based on interviews with 25 experts from universities, libraries, research funders and sector bodies and a rapid review of published literature.

UK and Australian universities are especially hard-hit

The risks of falling investment and ongoing disruption to research systems discussed in this report resonate across the globe, but the impacts of COVID-19 on national research ecosystems will vary. This study focuses on the UK and Australian research systems, whose health is closely tied to an uncertain international student market. The strategies adopted as the UK, Australia and other countries emerge from the current crisis will determine whether national research systems preserve or increase their competitive advantage - or suffer a permanent loss of capacity.

A dynamic take on an unfolding crisis

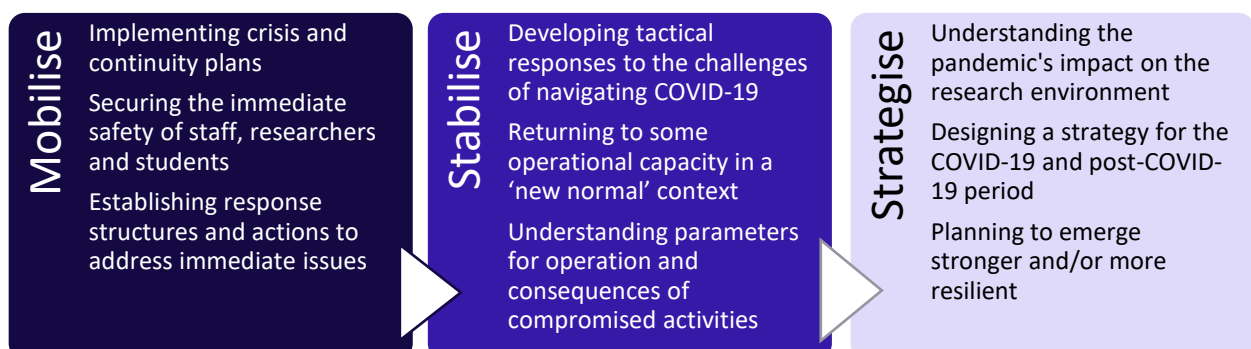
A focus on three types of impact

The study focuses on three dimensions of the research enterprise. First, it explores the pandemic's impact on **research production**, including the disruption of research activities, the loss of networking and publishing opportunities, and the uneven impacts on research careers. Second, it considers the consequences for **research information**, where an accelerated shift to digital has placed research infrastructure under strain, while open access and open data have gained prominence - just as library budgets are being squeezed. Finally, it discusses the prospects for **research funding** in an era of battered public finances and collapsing university budgets.

A phased response to the crisis

This report provides a preliminary assessment of a still unfolding crisis. Like other organisations, universities have reacted to the pandemic in three phases: they mobilised resources in the immediate term to secure the safety of their staff and students; they developed tactical responses to stabilise operations and navigate the new normal; and they are now called on to design strategies to emerge stronger in a post-COVID world.

Figure 1. A phased response to the crisis (adapted from: PwC 2020)



2. Doing research during the pandemic

Offline research is most affected

Researchers in all disciplines were impacted by COVID

Social-distancing measures have severely limited the ability to carry out research in all disciplines, delaying projects and creating uncertainty around time extensions and funding. Lab research was hampered by reduced access to facilities; research involving human subjects was hampered by reduced access to patients and population cohorts; academics relying on fieldwork faced restrictions on travel and freedom of movement; while, in the arts, humanities and social sciences, disruption was caused by lack of access to facilities, books and artefacts, as well as population cohorts.

The digitisation of research increases resilience

COVID-19's impact on research productivity depends on the extent to which a project could be successfully undertaken online. Digitisation of knowledge resources, a more flexible blend of online and offline research methods and use of remote communication tools emerge as key lessons for resilient research projects in the new COVID-19 world. By contrast, projects that rely on access to physical facilities and printed information remain compromised, given the wider operational challenges faced by universities in opening campuses for teaching and research.

The impact on researchers is uneven

Early career researchers have been especially affected

Early career researchers (ECRs) with small professional networks struggled to adapt to the new reality, and those on fixed-term contracts, or undertaking doctoral studies, faced an immediate need for funded extensions. A reduced ability to publish or network at events further threatens ECRs' career prospects, while hiring freezes and university budget cuts mean that getting a job in academia is seen as 'next to impossible'. This also undermines the position of postgraduate research students (PGRs), leading to calls for a reformulation of PhD training that prepares students for researchers outside academia.

"COVID could promote action on different models of higher degree research programmes focussed on careers other than the academy."

Professor Kate McGrath, Deputy VC: Research, University of Technology Sydney, Australia

The pandemic can reinforce inequality and further undermine mental health

Home working has had an uneven impact on research productivity. Women and younger researchers, (who often have more caring responsibilities), ethnic minorities and researchers from disadvantaged backgrounds have been more negatively affected. This risks reducing diversity in the research workforce and reversing progress made over the past few years. Moreover, there are growing concerns that COVID-compounded inequalities and social isolation will see researchers' mental health deteriorate.

"I am concerned that groups with protected characteristics will be set back, just at a time when progress was starting to be made."

Professor Steve Rothberg, Pro-Vice Chancellor (Research), Loughborough University, UK

Non-COVID research collaborations suffered

Cross-sector partnerships have mobilised resources to address the impacts of the pandemic

The coronavirus outbreak has accelerated cross-sector partnerships to speed up the scientific response to the crisis. During the pandemic, UK universities have developed new partnerships with the Government, the NHS and industry to rapidly scale up the country's research and diagnostic capacity. As outlined in the Universities Australia 2020-21 pre-budget submission, in Australia, universities have deployed staff and students into local health services, tested, designed and manufactured protective and medical equipment, and advised local, state, territory, national and international governments on their response. However, this prosocial behaviour has diverted resources (such as labs, equipment and staff) to healthcare, community support and testing for COVID-19, further disrupting research production.

The pandemic has hampered organic and international research collaborations

Despite the increasing use of online communication tools, social isolation has hampered the collaborations and organic communication that stimulate new ideas and research. International research collaborations have also suffered, with projects requiring international travel, field work or access to overseas facilities all but halted. There are emerging concerns that, in the long term, this could disrupt cross-border scientific work and prompt a gradual shift to 'research nationalism'.



Priority 1: Protect research capacity

Protecting capacity, talent and diversity is vital to the long-term health of the research system

COVID-19 has significantly impacted the ability of researchers to progress their work. Arrangements for opening campus facilities for research remain fragile, while there are growing concerns over researchers' mental health and wellbeing. Institutions, funders and policymakers must develop strategies to safeguard research capacity, develop and retain talent, and promote diversity for the long term. Alongside funding, discussed in section 4, this will require the development of new research priorities, methods, partnerships, postgraduate research training programmes and career pathways.

Figure 2. Protecting research capacity



3. Ensuring access to research information during the pandemic

Access to research information is disrupted

COVID has generated significant operational challenges for libraries, but their importance has been reaffirmed

The pandemic created significant challenges for academic libraries. During the crisis, lockdown prevented physical access, while social distancing still poses significant operational challenges for librarians and service users. In the UK and Australia, libraries continued to provide basic digital support for research, but the pandemic has led to a deep-rooted consideration of the role of off-campus digital access to collections.

The pandemic highlights the need to move towards 'digital first' infrastructure

The infrastructure that enables research data management (RDM) and sharing is increasing in importance as more researchers have to work from home and need to collaborate digitally. Difficulties encountered by some researchers and institutions in rapidly sharing data demonstrate the need for the various service providers of digital research services to become better integrated. Many also see a growing requirement for a scholarly communications infrastructure that is agnostic to the service providers. There is concern that scarce IT budgets will be focussed on student-facing services, to the detriment of investments in digital research infrastructure, such as high-performance computing and petabyte-scale data storage.

Library budgets are under pressure

Reduced library budgets are increasing scrutiny of journal subscriptions

The reduction in university income, coupled with increased demand for eBooks, is expected to put pressure on library budgets. There are now limited opportunities to cut operational costs, and therefore university libraries will be forced to conduct close examinations of bundled journal subscription packages. Universities in the UK and Australia are expecting to review their subscription agreements and COVID-related pressures may accelerate moves to cancel or renegotiate 'big deals' with publishers.

"The pandemic might provide a possibility for more stimulus for Open Research, but developments have been slowed down because we have not got the time to think about it."

Simon Bains, Head of Library Services, University of Aberdeen, UK

The 'pay to publish' model also presents financial pressures for libraries

COVID may provide an opportunity to move more to a "pay to publish" model. However, there are concerns that the model could increase scholarly communication costs, especially for research-intensive universities. Institutions expect to use their growing expenditure on article publication charges as leverage in negotiations with publishers and will increasingly look to combine their 'read' and 'publish' costs in a single agreement.

A catalyst for change

Use of scholarly content has greatly increased during the crisis

The pandemic has created a new urgency to rapidly share and review COVID-19 research, reflected in the launch of a cross-publisher rapid review and review transfer initiative. The lifting of paywalls on COVID-related publications has generated unprecedented usage of scholarly content and enabled sharing of scientific information among doctors, researchers and members of the public. The desire for faster publication also underpinned an acceleration in the use of preprints – scientific manuscripts that are publicly available in advance of formal peer review and publication. Yet high profile retractions have highlighted the importance of a strong peer-review system, even as peer reviewers, who are often established researchers in Western institutions, face increasing time pressures.

“One of the positive outcomes we have seen through COVID has been an increased awareness by our senior researchers of the benefits of open access publications.”

Julie Hockey, Deputy Director of Resources and Technical Services, University of South Australia Library, Australia

The pandemic may become the ‘poster boy’ for open science

Although developments in scholarly communication have slowed in recent months due to the pressing challenge of dealing with the crisis, the role of research during the pandemic has raised awareness of open science among researchers, decision-makers and the broader public. As the dust settles, the expectation is that funders and open science advocates will use the pandemic as the ‘poster boy’ for open science, providing renewed impetus for change. International actors including the European Commission, the World Health Organisation and UNESCO have all issued strong calls for greater and more equitable access to research results in recent months.



Priority 2: Transition to open science

Open scholarly communication requires investment and innovation

COVID-19 has exposed longstanding fault lines in the current system of scholarly communication. While the balance appears to have shifted decisively in favour of open science, concerns around quality assurance and financial sustainability remain unresolved. Strategic thinking is needed to tackle a legacy of a lack of investment in digital infrastructure, redefine the roles of commercial and community actors, develop a more efficient peer review process, and embed open science as the ‘new normal’ for research.

Figure 3. A sustainable model for open science



4. Understanding the pandemic's impact on research funding

Targeted funding has been used to address the pandemic

Research funders have responded quickly to the pandemic...

The research system has mobilised quickly to respond to the challenges of the pandemic. In the first phase (mobilisation), funders prioritised supporting research activities directly related to the disease, such as medical research. In the second (stabilisation), funders are focusing on activities related to the effects of the pandemic on the economy or on society, such as the delivery of care. In the third (strategising), funders have begun considering the impact of the pandemic on science, science funding and the broader landscape.

...but researchers believe funding systems still lack agility

Funders have also been modifying their processes in order to reduce the timescale of application to award and hence to research activity taking place. This has included reduced documentary requirements and rapid peer review. Whilst the changes have been welcomed, many researchers and research managers believe that the pandemic has exposed a lack of agility and responsiveness in the research funding system and have called for further administrative reforms to tackle this.

University budgets are strained

The cross-subsidisation of research by teaching has been exposed

Universities remain in a stabilisation phase, seeking ways to protect researchers and research capacity. However, the pandemic has raised questions about the sustainability of a model where international student fees are used to cross-subsidise research. With borders shut or international travel severely curtailed in many regions, UK and Australian universities are particularly exposed to a downturn in international student recruitment, as shown in Figure 4, below.

"A particular UK concern is that of the cross-subsidy from non-publicly funded teaching to research, and the dependency by some on charitable funding sources. There is now a better understanding of the cost and vulnerability of the research system."

Dr Steven Hill, Director of Research, Research England, UK

Shortfalls in international student numbers put research at risk

Early estimates suggested UK institutions could lose £2.5 bn (AU\$4.4 bn) in tuition fees and teaching grant income in the 2020/21 academic year alone, putting up to 30,000 jobs at risk. Australian universities, meanwhile, face revenue losses of AU\$3.1 bn to AU\$4.8 bn (£1.75 to £2.7 bn) in 2020, threatening 21,000 full-time equivalent jobs. There are emerging indications that the downturn in student numbers might not be as bad as initially feared, and the full impact on university finances will only become apparent over the coming years. Yet a loss of research capability is already occurring, with voluntary severance and restructuring schemes being implemented by multiple institutions in both countries.

Figure 4. OECD countries' reliance on international students to support higher education research (source: OECD)



"The reduction in revenue from international education will have a serious flow-on effect to the capacity of Australia's universities to conduct research and development on behalf of the nation."

2020-21 Pre-Budget Submission, Universities Australia

Research funding is under threat

Government funding for university research is under pressure

COVID-19 provides cover for governments already committed to research budget cuts, while more research-friendly ones face stark choices in light of the new economic reality. At a moment when we need more research, the best scenario many universities can hope for is a continuation of existing budgets. But even that seems unlikely in many cases. There are ongoing debates over future levels of research funding in the European Union and Australia; by contrast, the UK has to date, maintained its research and development spending commitments, but there are some fears that the additional funding will be focused towards industry.

A further shift towards applied research is likely

With future recovery plans and funding prioritising economic recovery and growth, COVID-19 is expected to drive a move from basic to applied research. In the UK, Australia and the European Union, the argument that investment in research also creates an economic benefit is already shifting to one of investment *because* it creates an economic return. There are growing concerns that an 'investment model' for research would penalise basic research and high-risk projects, as well as research in the arts, humanities and social sciences.

"The national picture is being shaped by the question: 'What is research for?' ... It is not enough to have an effect on the regional economy simply by existing. It needs the combination of research and innovation and education and engagement to create a platform for regional success."

Dr Sean Fielding, Director of Innovation, Impact and Business, University of Exeter and Chair of PraxisAuril, UK

Charitable and industry research funding will be unevenly impacted

The consequences of COVID-19 for the wider research funding landscape will be uneven. Both research charities and industry partners are facing financial challenges as the general economic condition worsens, and those operating in hard-hit economic sectors will be most impacted. Some impacts are already apparent. For instance, support for medical research has increased during the pandemic, while R&D intensive sectors like aerospace have contracted. However, the full impact on research will only become clear over the coming years, as current funds dry up and the opportunities for new research decline.

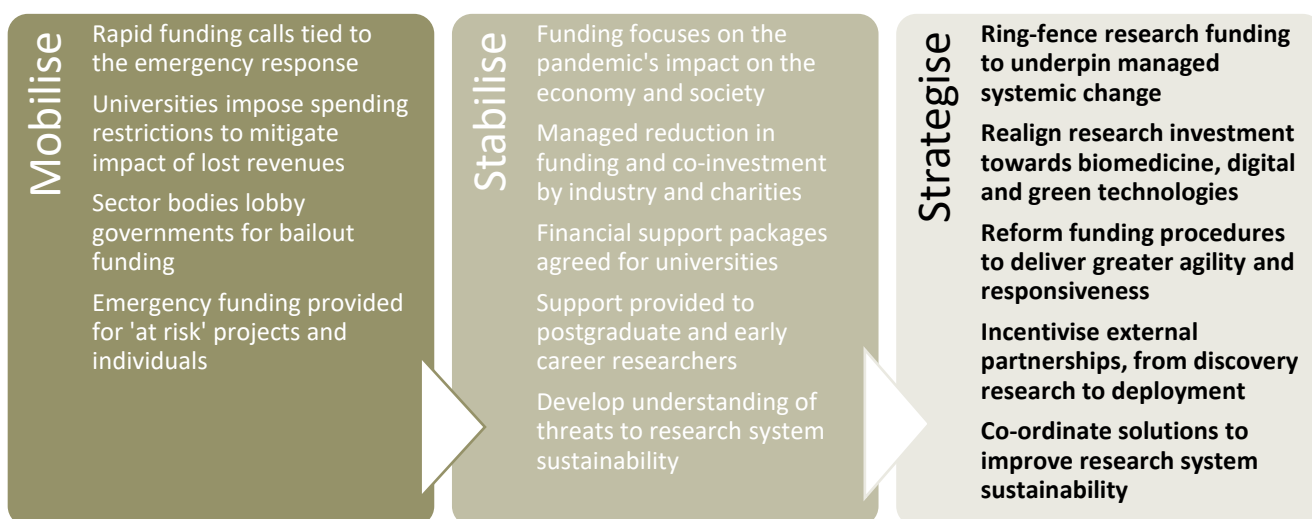


Priority 3: Secure research funding

Public funding for research must be secured for the long-term

Researchers and institutions are faced with a range of fundamental uncertainties that are inimical to strategic thinking, long-term planning, and, most importantly, excellent research. These challenges are global, but are particularly acute in those university systems, like the UK and Australia, where the sustainability of research relies on international student fees. Governments and research funders can mitigate the damage by providing bridging funds to stabilise the system, ring-fencing public research funding for the medium and long-term, and taking co-ordinated action to improve the sustainability of the research system.

Figure 5. The role of funding in the pandemic response



5. Prioritising a research-led recovery

Three priorities for a research-led recovery

University research has the potential to play a central role in the COVID-19 recovery. Its ability to fulfil this potential relies on governments, policymakers and other stakeholders recognising and addressing the three priorities identified in this study.

15 strategies to equip research systems for the future

Drawing on the preceding sections, we have identified five strategies relevant to each priority. The 15 strategies are summarised in Table 1, with an indication of the key stakeholders responsible for their implementation in each case.



Priority 1 - Protect research capacity (CAP1-5)



Priority 2 - Transition to open science (OS1-5)



Priority 3 – Secure research funding (RF1-5)

Table 1. 15 Strategies to equip research systems for the future

Recovery strategy	Stakeholder group							
	Researchers	Universities	Research funders	Governments & policy makers	Learned societies & Academies	Research & E-infrastructures	Research libraries	Publishers
CAP1 - Rebalance research effort to tackle changing national and global priorities								
CAP2 - Develop blended online and offline research methods								
CAP3 - Strike new partnerships to counter 'research nationalism'								
CAP4 - Address instability and structural inequality in academic career pathways								
CAP5 - Reform postgraduate research training								
OS1 - Increase investment in digital infrastructure								
OS2 - Redefine roles for commercial and community actors								
OS3 - Enable innovation in peer review								
OS4 - Embed preprints in publication workflows								
OS5 - Adopt open science as the 'new normal'								
RF1 - Ring-fence research funding to underpin managed systemic change								
RF2 - Realign research investment towards biomedicine, digital and green technologies								
RF3 - Incentivise external partnerships, from discovery research to deployment								
RF4 - Reform funding procedures to deliver greater agility and responsiveness								
RF5 - Co-ordinate solutions to improve research system sustainability								

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The Ingenuity Centre, University of Nottingham Innovation Park, Nottingham, NG7 2TU, UK

www.research-consulting.com



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