ISBN 978–0–9924254–8–7 (print)
ISBN 978–0–9924254–9–4 (digital)
ISBN 978–0–9943687–0–6 (HTML)

Australian Government
Australian Research Council

2015 2016

State of Australian University Research

Volume 1 ERA National Report

MINISTER'S FOREWORD

I am pleased to present the *State of Australian University Research 2015–16: Volume 1 ERA National Report* (ERA 2015), a comprehensive assessment, by discipline, of the quality of research conducted in Australia's higher education institutions.

In Australia, and around the world, high quality research is driving innovation that saves lives, answers social and environmental imperatives, improves economic productivity and growth, and creates the jobs of the future. The Australian Government will invest $9.7 billion in 2015–16 into research across education, industry, health, defence, environment and agriculture that will help ensure the Australia of the future is agile, creative and innovative, and able to compete with the best in the world.

ERA 2015's internationally benchmarked data shows that Australia's research effort, conducted in universities across the nation and in every broad discipline group, continues to perform well–above world standard.

It also showcases the rich research diversity, strength and excellence across the spectrum of Australian universities.

With ERA 2015, Australia now has longitudinal data on our research effort since 2003 — an invaluable resource for universities, industry and other users of research, and policymakers.

This will be used to help map progress in meeting the Australian Government's Science and Research Priorities, and corresponding Practical Research Challenges.

ERA is also a quality assurance mechanism for Australia's universities, which reported $9.9 billion in research income between 2011 and 2013.

Encouraging stronger incentives for research–industry collaboration and better translating research into commercial outcomes — as promoted by the Government's Boosting the Commercial Returns from Research strategy — is a high priority so as to maximise the economic and social outcomes of Australia's high–quality research.

I congratulate the Australian Research Council and all of the universities that contributed to ERA 2015 for their commitment to Australian research investment, performance, and discovery.

Senator the Hon Simon Birmingham

Minister for Education and Training

CEO'S FOREWORD

This is the inaugural *State of Australian University Research 2015–16*. In the past, the ARC has released the ERA results through an ERA National Report and Volume 1 of this *State of Australian University Research 2015–16* continues that tradition. It comprehensively details the quality of Australian university research benchmarked against world standards.

With three rounds of ERA now complete, this unique dataset covers all Australian university research outputs, staffing and activity from 2003 to 2013, and research income and research application data from 2006 to 2013.

Over the coming year the ARC will produce additional volumes based on analyses of this longitudinal data, which will provide further insights into the state of Australian university research. Volume 2 will be released in April 2016.

ERA is the primary mechanism to assure Government of its research investment in Australian universities. ERA 2015 results clearly demonstrate that Australian universities are diverse and that much of their research meets world standard or better.

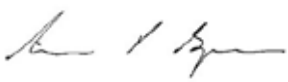
This report identifies the excellence in research across a broad range of universities and the outstanding performances in areas of specialisation. Overall the quality of Australian university research continues to improve.

The data also shows solid growth of the sector from the previous ERA round. For ERA 2015 data for over 430,000 unique research outputs and 67,000 researchers was collected from the 41 participating universities. There were 2,460 units of evaluation assessed, including 1,802 four–digit and 658 two–digit disciplines.

ERA would not be possible without the support the ARC receives from the sector. In addition to sector–wide consultations to help refine the ERA 2015 process and the work of all universities during the submission stages, there were 155 Research Evaluation Committee members and about 1,300 peer reviewers from Australia and overseas appointed to conduct the evaluations.

This strong sector engagement maintains the confidence that ERA is the most rigorous and effective measure of research quality in Australia's universities. I would like to take this opportunity to thank all those involved at various stages of the ERA process and in particular the ARC ERA staff.

I strongly encourage universities, industry and other research users to make use of the valuable information that ERA provides.



Professor Aidan Byrne
Chief Executive Officer
Australian Research Council

CONTENTS

SECTION 2: OVERVIEW BY TWO–DIGIT FIELDS OF RESEARCH CODE 85

SECTION 3: RESULTS BY FIELDS OF RESEARCH CODE 103

SECTION 4: NATIONAL PROFILES BY FIELDS OF RESEARCH CODE 261

SECTION 5: ERA 2015 INSTITUTION REPORT 363

ABBREVIATIONS

AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
ANZSRC	Australian and New Zealand Standard Research Classification (ANZSRC) 2008
ARC	Australian Research Council
BB	Biological and Biotechnological Sciences discipline cluster/Research Evaluation Committee
CRC	Cooperative Research Centre
EC	Economics and Commerce discipline cluster/Research Evaluation Committee
EE	Engineering and Environmental Sciences discipline cluster/Research Evaluation Committee
EHS	Education and Human Society discipline cluster/Research Evaluation Committee
EPO	European Patent Office
ERA	Excellence in Research for Australia
FoR	Fields of Research (ANZSRC)
FTE	Full–Time Equivalent
HCA	Humanities and Creative Arts discipline cluster/Research Evaluation Committee
HERDC	Higher Education Research Data Collection
HESDC	Higher Education Staff Data Collection
JPO	Japan Patent Office
MHS	Medical and Health Sciences discipline cluster/Research Evaluation Committee
MIC	Mathematical, Information and Computing Sciences discipline cluster/Research Evaluation Committee
NHMRC	National Health and Medical Research Council
NTRO	Non–traditional research outputs
PBRs	Plant Breeder's Rights
PCE	Physical, Chemical and Earth Sciences discipline cluster/Research Evaluation Committee
REC	Research Evaluation Committee
SRE	Sustainable Research Excellence
UoE	Unit of Evaluation
USPTO	United States Patent and Trademark Office

GUIDE TO THE REPORT

The *State of Australian University Research 2015–16: Volume 1 ERA National Report* presents a comprehensive assessment by discipline of the quality of research activity conducted in Australia's higher education institutions. This volume provides information on the discipline–specific research activity of each eligible Australian higher education institution (see ***Appendix 1**: Eligible Institutions*), and the contribution of each discipline to the national landscape.

The *ERA National Report* is divided into six sections which are listed below:

- The **Introduction** provides an overview of the ERA framework and methodology
- **Section 1: ERA 2015 National Overview** provides a national summary of world standard research performance, a summary of all data submitted for the purposes of the ERA evaluation, some comparative data for ERA 2010, ERA 2012 and ERA 2015, and some preliminary analysis of the ERA 2015 submission data
- **Section 2: Overview by Two–Digit Fields of Research (FoR) Code** provides a summary of two–digit FoR codes for the suite of indicators presented in ERA
- **Section 3: Results by Fields of Research (FoR) Code** provides a summary of evaluation outcomes and data for each FoR code, including key volume and activity information and ERA rating outcomes
- **Section 4: National Profiles by Fields of Research Code** provides a detailed breakdown of ERA data by two– and four–digit FoR codes
- **Section 5: ERA 2015 Institution Report** provides the ERA ratings for each assessable Unit of Evaluation (UoE) for each of the 41 institutions eligible for ERA.

Enquiries about the *State of Australian University Research 2015–16: Volume 1 ERA National Report* should be directed to:

Leanne Harvey
Executive General Manager
Australian Research Council
Tel +61 (02) 6287 6755
Email era@arc.gov.au

This report is available on the ARC website at: arc.gov.au/excellence-research-australia

If you have issues with obtaining any information or document on our website, please contact the ARC on +61 (02) 6287 6600 or web@arc.gov.au.