



Australian Research Data Commons

# ARDC Translational Research Data Challenges Program: Bushfire Data Challenges

Driving innovative and high-impact digital infrastructure for real-world problems

September 2020

## Background

The Australian Research Data Commons ([ARDC](#)) is a National Collaborative Research Infrastructure Strategy ([NCRIS](#)) facility, providing Australian researchers with competitive advantage through data. The Translational Research Data Challenges program is a new national-scale 'flagship' initiative providing innovative and high-impact digital infrastructure solutions to real-world problems. The program focuses on translational research, operating at the intersection of research and broader society, to provide tangible and enduring economic, environmental and social benefits to Australia.

Collaborating with partners from governments, research institutions and industry, the Translational Research Data Challenges initiative will develop projects that address societal problems by removing barriers to the access, analysis and curation of data. Projects will be problem based, national scale, collaborative, unique, enduring and integrative across technological, cultural and organisational silos.

The Translational Research Data Challenges approach starts with a pressing societal problem, such as disaster resilience, crop yields or obesity. Through stakeholder consultations, key data challenges will be identified — such as data scale, sensitivity, availability and usability — that currently impede the advancement of solutions to these societal problems. Projects will focus on the development of digital infrastructure solutions, drawing on capabilities such as quality data collections and analytic platforms, underpinning compute and storage, informatics and data science expertise, as well as relevant governance and policy frameworks.



**START**  
WITH A SOCIETAL  
PROBLEM



**IDENTIFY**  
THE DATA  
CHALLENGE



**BUILD**  
AND APPLY DIGITAL  
INFRASTRUCTURE

## Bushfire Data Challenges

As described above, the Translational Research Data Challenges program is founded on addressing a real-world problem. Through background research and consultations, the ARDC will identify an overarching societal problem and a more specific impact area for each round of the program.

The recent drought, bushfire and pandemic disasters that have challenged our society have highlighted the need for systemic information infrastructure to contribute to the analysis, response and management of such crises, as well to monitor the long-term impacts. In response to this acute demand, the first Translational Research Data Challenge societal problem is ‘Disaster Resilience and Risk Reduction’, with an initial focus on the impact area of ‘Bushfires’.

Bushfire research is a highly topical area that presents its own unique data challenges and would greatly benefit from increased collaboration across governments, research and industry. Reliable access to data about bushfires and their impacts is essential for effective planning and preparedness. In this area, data are currently spread across many platforms and jurisdictions, with limited opportunities for sharing technological infrastructure or methodological approaches.

The Office of the Chief Scientist’s recent report ‘Bushfire Research and Technology: Mapping Australia’s Capability’ (June 2020) maps Australia’s capability in bushfire research across nationally coordinated initiatives. These include the Australian Institute for Disaster Relief (AIDR), the Bushfire and Natural Hazards Cooperative Research Centre (BNHCRC), Emergency Management Australia (EMA), the university sector and publicly funded research agencies (such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Bureau of Meteorology (BoM), and Geoscience Australia (GA)) [Figure 1].

The report identifies the adoption of advanced technology as key to improving Australia’s bushfire resilience, response and recovery. In particular, the ARDC has recognised the need for a systematic framework of harmonised data production, access, analysis and governance to enhance the use of data to drive impactful bushfire research. Projects in the Translational Research Data Challenges program will develop digital infrastructure solutions to

reinforce the extensive breadth of bushfire research capabilities and drive collaboration across the bushfire research ecosystem.



Figure 1: ‘Overview of Australia’s Bushfire Capabilities’ diagram from the Office of the Chief Scientist’s report ‘[Bushfire Research and Technology: Mapping Australia’s Capability](#)’ (June 2020)

Disaster management involves activities to prepare for, respond to and recover from disasters ([UNDRR terminology](#), 2020). A broad spectrum of research areas support this disaster resilience, including observation, analysis, and modelling of fire ecology, climate, environment, biodiversity, critical infrastructure, built infrastructure, as well as economic, social, and health outcomes. This program will identify bushfire research priorities that will benefit from an uplift in digital infrastructure, in alignment with national initiatives. Some potential focus areas in bushfire research where new and innovative digital eResearch infrastructure would be beneficial include:

- Risk mapping of fuel loads through remote sensing
- Fuel reduction burns for asset protection
- Infrastructure resilience (energy, transport, communication networks)
- Early warnings (predicting one severe or multiple events close together in time)
- Forecasting vegetation and soil moisture using satellite data
- Fire behaviour modelling and prediction
- Smoke and air pollution behaviour modelling
- Recovery of flora and fauna
- Community resilience and recovery:
  - Quantifying environmental exposures and impact on health (e.g. smoke haze and air quality)
  - Quantifying impact combining community exposure and vulnerability

## In Scope Activities

Projects in the Bushfire Data Challenges program will build digital infrastructure solutions to support researchers who improve Australia’s preparedness, response and recovery from bushfire disasters. Projects will establish, develop or adopt national scale digital assets and deliver improvements to:

- Data collections
  - Discoverability and accessibility

- Coverage
- Quality and usability
- Standards and interoperability
- Capture and processing pipelines
- Analytical and access platforms
  - Modelling, visualisation and analytical tools
  - Interfaces to relevant data sources
  - Sophisticated access and authorisation for sensitive data
  - Collaborative environments
- Underpinning infrastructure
  - Storage
  - Compute
- Broader culture and policy frameworks
  - Community consensus building for adoption and implementation of the above
  - Legal and policy enablers
  - Governance and collaborative arrangements
  - Business models
  - Rewards and incentives
  - Awareness raising and human capability building

The improved infrastructure is the output of the project, including new multi-party governance and collaborative arrangements needed to sustain it.

## Program Process

The development of projects within the Bushfire Data Challenges program will take a participatory design approach. The ARDC will facilitate collaborative partnerships between government agencies, industry, research institutes and other relevant stakeholders.

The ARDC invites interested participants to register their interest via the online form. The ARDC will then host a series of participatory workshops and consultation meetings with registered stakeholders in order to build the collaborative scale and focus of the projects. Through these workshops, opportunities will be identified to align new research infrastructure with existing research priority areas determined by nation-wide bushfire initiatives (e.g. AFAC, AIDR, BNHCRC, CSIRO, Office of the Chief Scientist).

Discussions will focus on identifying the various data challenges and technological barriers that exist within these research priorities, such as access to relevant data, interoperability, data scale, data sensitivity, data analytics methods, data pipelines and data governance frameworks.

Through a series of roundtable discussions, potential solutions to overcoming these data challenges will be channelled into specific project proposals. Those organisations who have participated in the workshops will be invited to submit proposals for projects.

The selection criteria to determine successful projects will be developed during the participatory design phase, including input from participants and experts. Decisions will be informed by the advice of the expert assessors. Successful projects are expected to commence mid-2021.

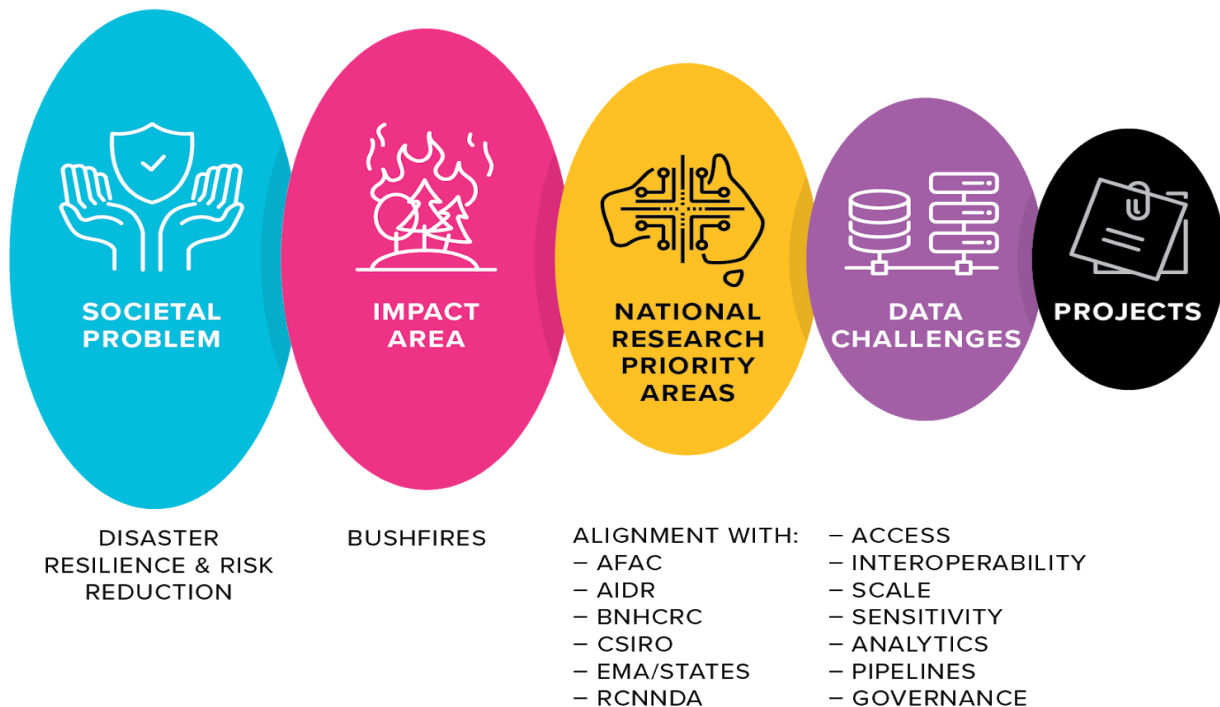


Figure 2: ARDC Translational Research Data Challenges on Bushfires Funnelling Framework

## Participants

Participants will take part in workshops and roundtable sessions to identify opportunities and design collaborative proposals to build national bushfire research digital infrastructure. Interest is sought from both potential users, beneficiaries, developers and operators of such infrastructure.

The Bushfire Data Challenges program seeks to cross technological, cultural and organisational silos by bringing together collaborators from governments, research institutions (such as universities, NCRIS facilities, publicly funded research agencies and medical research institutes), industry and other relevant stakeholders. This will foster strong and enduring partnerships, while also ensuring a coordinated approach to solving the data challenges currently impeding the advancement of bushfire research. In particular, the contribution of Indigenous leaders will greatly empower this program. The ARDC invites interested participants across Australia to register their interest via the [online form](#).

## Timeline

- 30 September to 16 November 2020: Register of interest open
- December 2020 to January 2021: Participatory workshops
- January to March 2021: Roundtable sessions

- Q1 2021: Proposal development
- Q2 2021: Successful projects announced

## Project Funding & Duration

While the scope of projects will depend on the outcomes of the consultation/facilitation phase (Dec-Mar), the ARDC will invest upwards of \$1m each in two Bushfire Data Challenges projects to commence in 2021. ARDC standard policy requires a 1:1 co-investment ratio between ARDC’s investment and that of all the other project participants combined.

The project duration is up to three years, with an expectation that the new digital infrastructure will be maintained by the project participants on an ongoing basis following the formal project phase.

As well as financial investment, projects will be eligible for a number of resources provided by the ARDC, such as an embedded ARDC expert, support for communities of practice, cloud and compute allocation (confirmed for the duration of the project), specialist consultancy, and support for and access to ARDC national information services for identifiers, vocabularies and catalogues.

## General Outline of Projects

Projects in the Translational Research Data Challenges program will have the following elements:

Inputs →	Activity →	Outputs →	Outcome →	Impact
Resources from: - ARDC - Research organisations - Public and private sector - Beneficiary groups - National bushfire coordination initiatives	Changes to: - Data collections - Analytics and access platforms - Underpinning infrastructure - Culture and policy frameworks	Improved national infrastructure for translational research.	Use of this infrastructure for translational research applied to public sector service provision and policy and/or private sector business activity.	Improvements to: - Research efficiency - Environmental, social, economic benefits



The formal project will typically finish after the ‘outputs’ stage above. It is expected that project participants will maintain the new capability as ‘business as usual’ as part of the national eResearch infrastructure. The ARDC will remain in formal communication with project participants beyond the outputs stage to monitor and report outcomes (research usage of the infrastructure) and impacts (improvements to research efficiency, as well as broader societal benefits).

## Frequently Asked Questions

If you have any questions please [contact us](#). These questions and their answers will be entered into a publicly available [FAQs Register](#).