ACCESS-NRI
what it is, what was proposed, and why

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What is ACCESS?

ACCESS is a large computer modelling system for research with atmospheric, ocean, sea-ice, and land surface models coupled to a range of chemical and biological models.

ACCESS models evolution of climate, weather and the earth's environment at all timescales up to millennial.

ACCESS has been built through collaboration between the Bureau, CSIRO and universities - notably UNSW, ANU, Melbourne, Monash, UTas, partners in the CLEX Centre of Excellence

ACCESS has had support historically from a variety of government programs (e.g. ACCSP)

Background_1

The Australian Government responded in 2018 to the 2016 National Research Infrastructure Roadmap by establishing scoping studies for eight additions to our National Research Infrastructure (NRI).

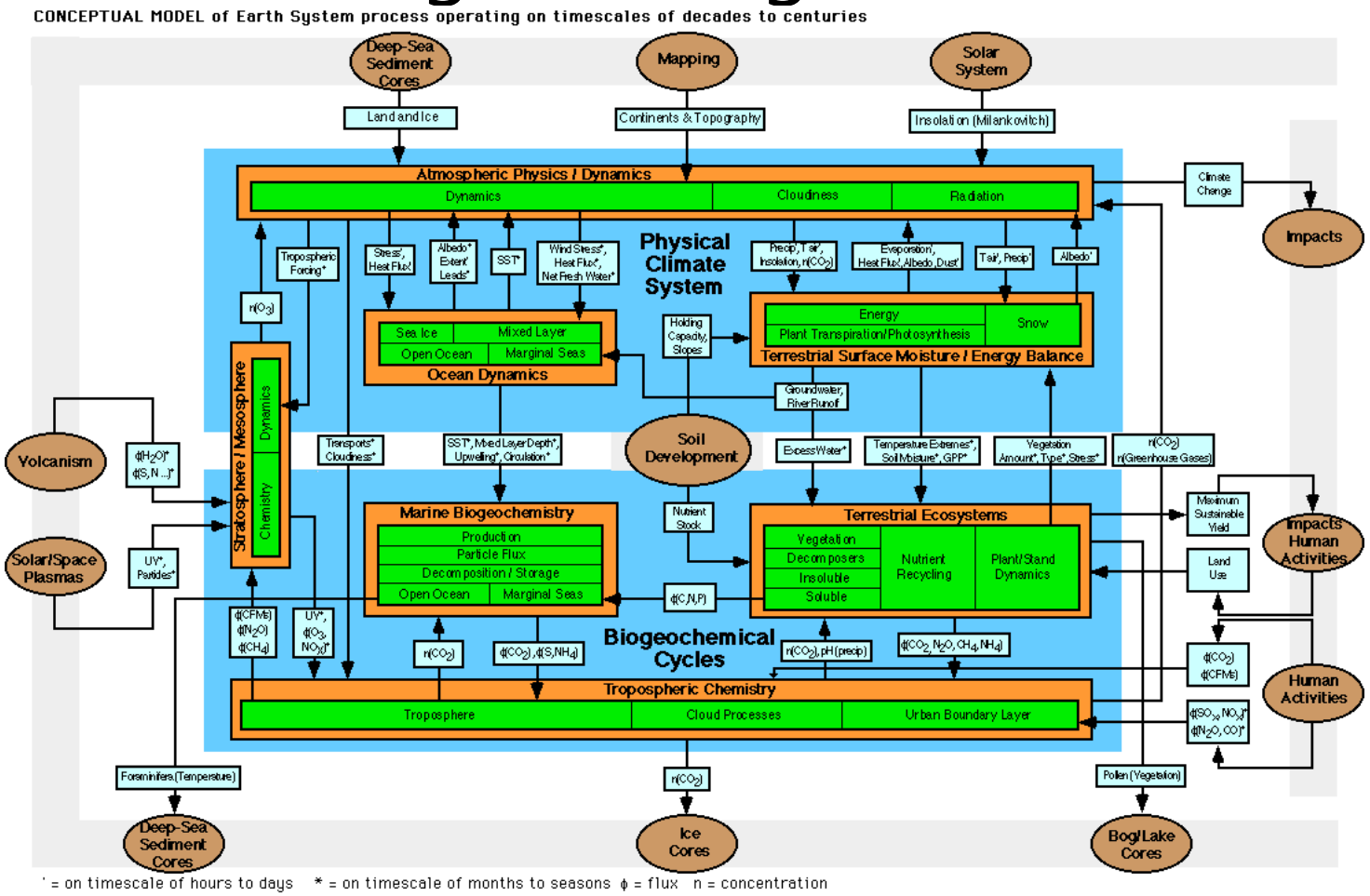
First on the list was **Enhancing the Australian Community Climate and Earth-System Simulator (ACCESS)**. The ACCESS-NRI Scoping Study commenced in August 2018, submitting its report with a proposed facility design at the end of July 2019.

Background_2

The need for this 'enhancement' was well understood nationally.

The National Climate Science Advisory Committee's major report *Climate Science for Australia's Future* completed in July 2019 referred to the pivotal importance of ACCESS and its ongoing development more than 80 times in 64 pages.

Challenges Facing ACCESS: 1-complexity

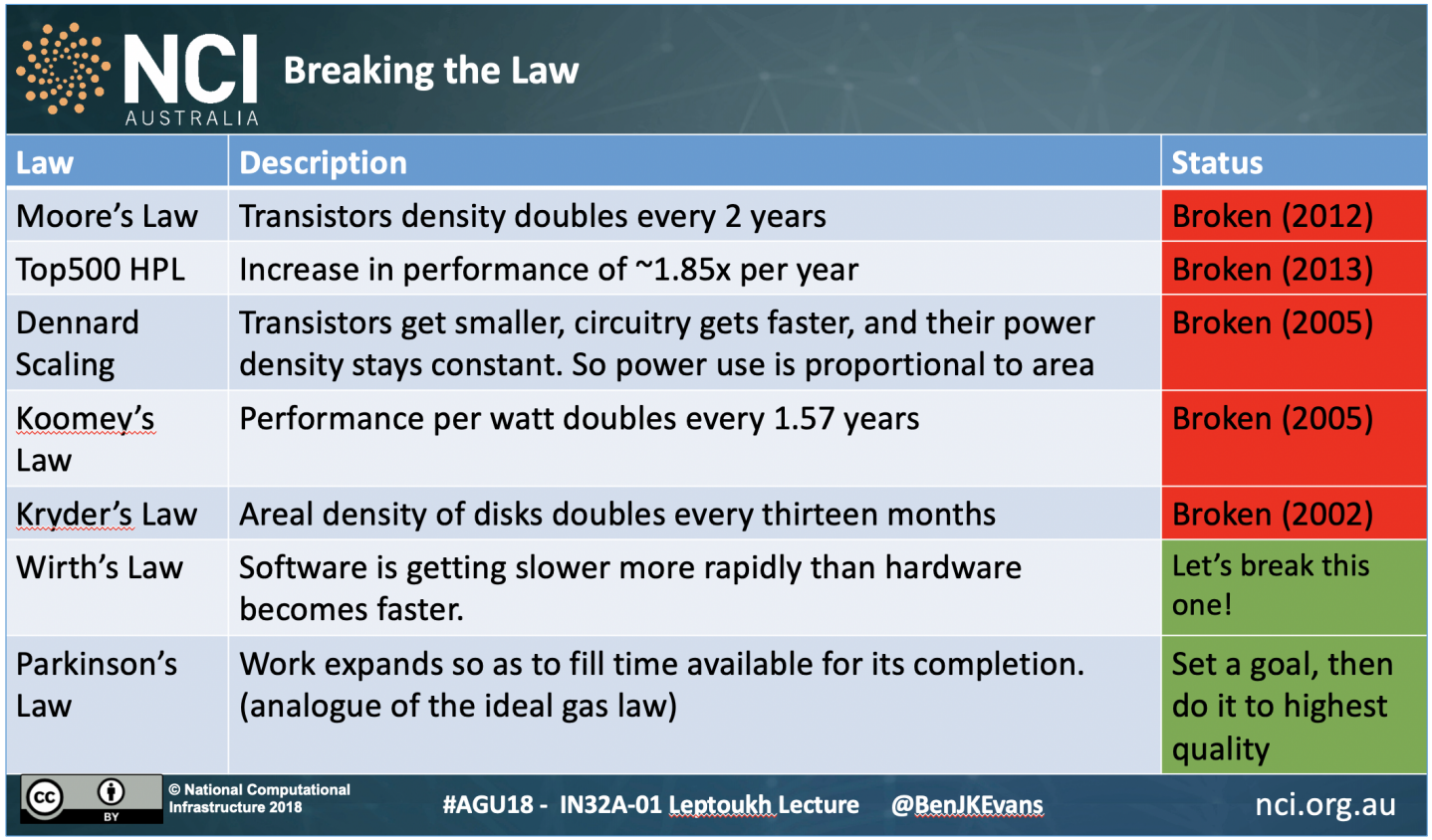


source: Iowa State University

ELEMENTS

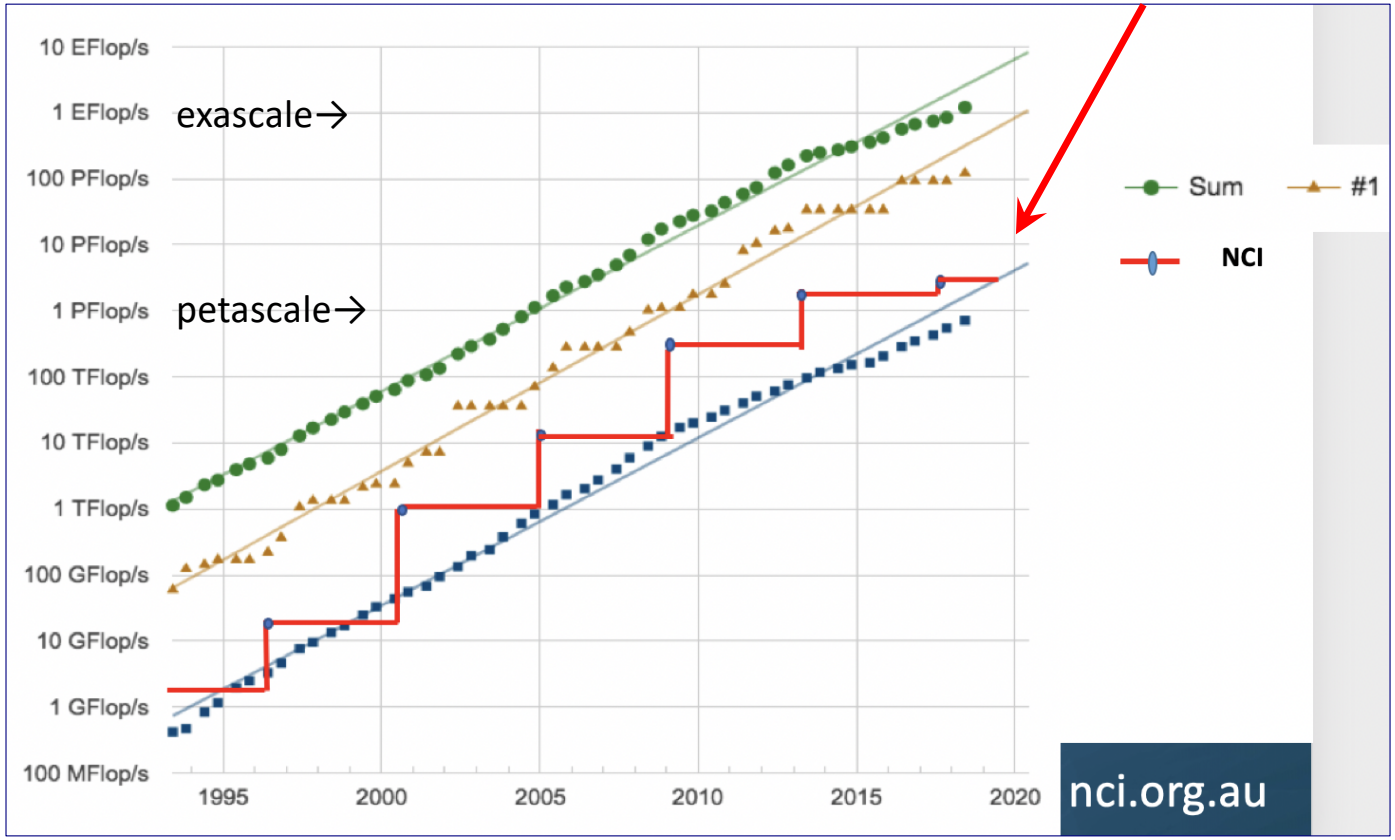
- coupling of models
- 3.5+M lines of code
- individual scientists
- coding standards
- validation
- release
- international contributions
- user access
- collaboration!

Challenges Facing ACCESS: 2-evolution of HPC

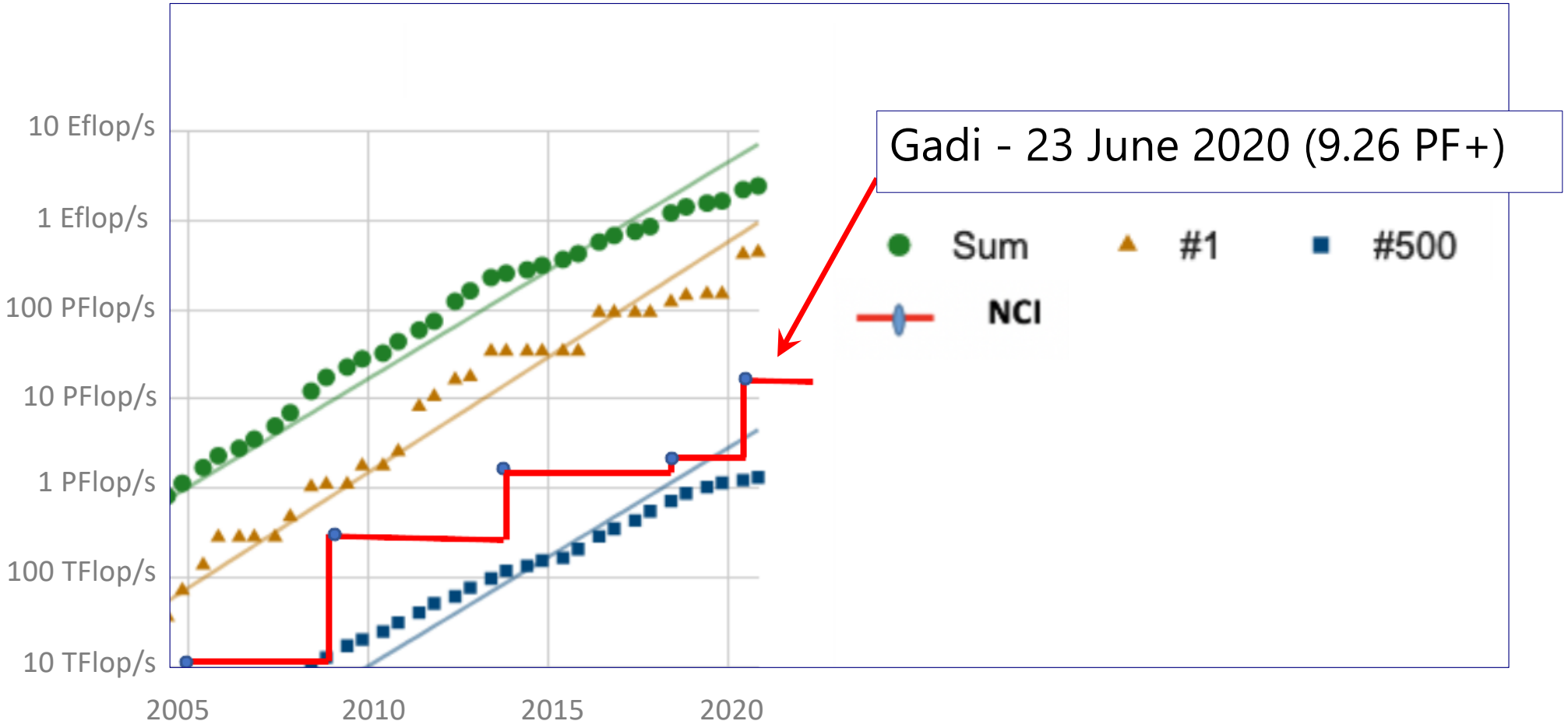


Some of the several major technical "laws" c/- Ben Evans, AGU 2018 Leptoukh Distinguished Lecture

Challenges Facing ACCESS: 2-evolution of HPC



- move to exascale
- changed architecture
- changed workflow
- different code
- recoding challenge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2005
2010
2015
2020

NRI Design: The Bruce Hicks imperatives

1. What are we doing?

and

2. Why are we doing it?

Vision: Australian researchers in weather, climate and Earth Systems Science solve problems of critical national importance now and in the future, using research infrastructure that maximises the value of investment in this and related science necessary to understand and manage the risks and opportunities inherent in environmental change.

Mission: To build a merit-based open access national research infrastructure to transform the quality, scale, significance, efficiency and relevance of Australia's weather, water, climate and Earth Systems Science research.

Objective: Policy makers, decision makers and resource managers across government, business and community are provided with the scientific research they need for evidence-based action on opportunities and threats posed by ongoing weather and climate variability and trend.

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Scoping Study - response to challenges

after wide consultation and 'benchmarking' with reserach community and technical experts nationally, internationally → proposed design

Proposed Facility Design

Staff: 34FTE, comprising a Director with PA, Business Manager and User Engagement Manager (4FTE), a Model Development Portfolio comprised of Atmospheric, Ocean, Land Surface Infrastructure, and Software Transformation/New Techniques Teams (15FTE), an ACCESS Release Management Portfolio comprised of Coupled Model Infrastructure, Configurations Release and Training & Uptake Teams (15FTE).

Governance: The proposal envisages the ACCESS-NRI operating under a Formal Collaboration Agreement between Principal Partners with the facility administered by the ANU as Host Institution. Principal Partners would have representation on the Facility's Governance Board, which would be assisted in its role by a Scientific Advisory Group having members drawn from and representing the research community of ACCESS users.

ACCESS-NRI proposed staffing

DIRECTOR'S OFFICE (4)

MODEL DEVELOPMENT LEADER (1)

- Atmospheric Model Infrastructure Team (4)
- Ocean Model Infrastructure Team (4)
- Land Surface Model Infrastructure Team (3)
- Software Transformation & New Techniques (3)

RELEASE MANAGEMENT LEADER (1)

- Coupled Model Infrastructure Team (6)
- Release Manager (6)
- User Access Training & Uptake (1)
- User Access Training & Documentation (1)

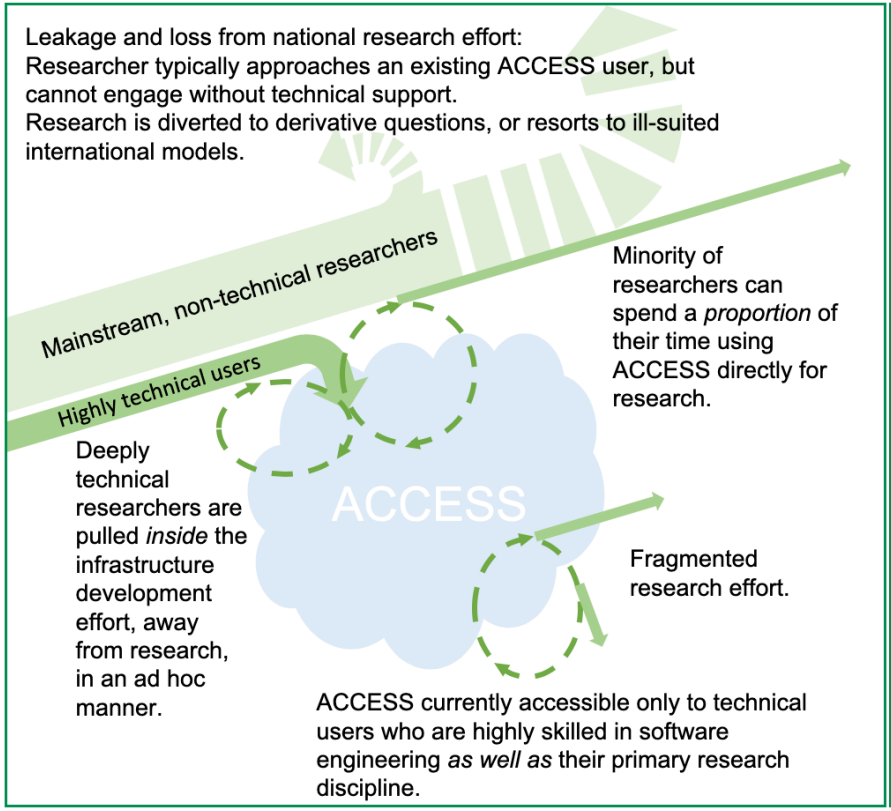
Examples of roles proposed

Ocean modelling infrastructure team lead
Senior Software Engineer /Developer (developer and optimisation)
Software Engineer / Developer (developer and maintenance)
Software Engineer / Programmer (diagnostics and performance)

Coupled model infrastructure team lead
Senior Software Engineer (coupler development and maintenance)
Software Engineer / Developer (configuration development)
Software Engineer / Developer (configuration development)
Software Engineer / Developer (international initiatives)
Software Engineer (accelerated architectures)

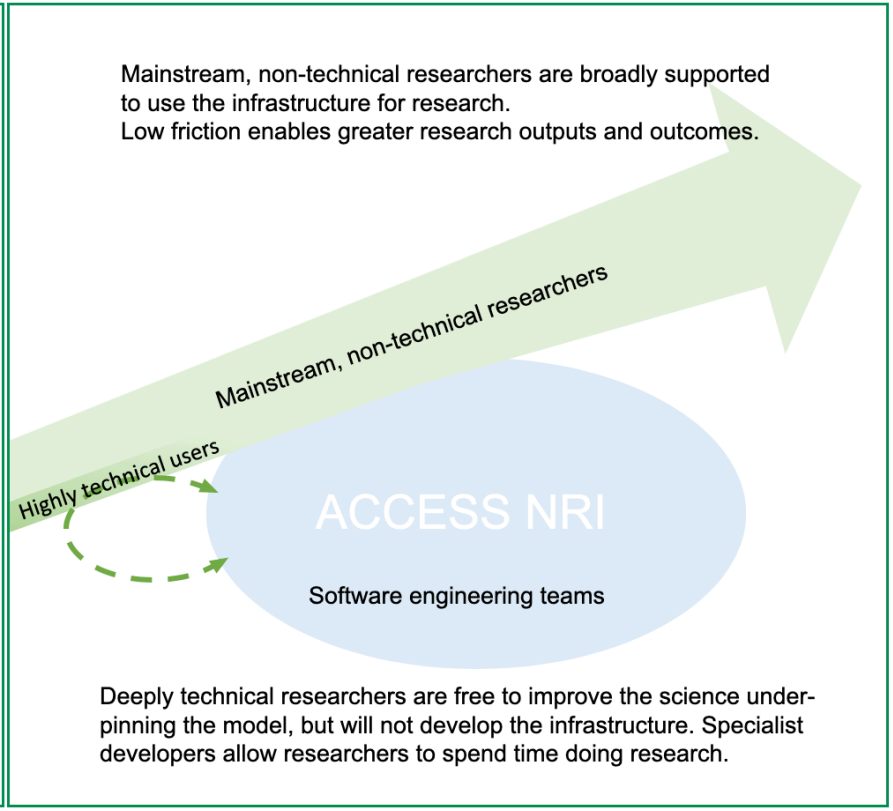
Current ACCESS

Highly technical interface, closed to most researchers



ACCESS NRI

Open, accessible research interface



Implementation arrangements

. . . . . not yet announced

The ACCESS proposal will:

- Avoid the loss of a national weather, climate and Earth Systems simulation capability that is inevitable in the absence a new facility to host a properly software engineered system that meets world standards, and designs and manages the software transition needed for the imminent arrival of new computer architectures, exascale computing, and an explosion of 'big data'
- Significantly enhance capability for research in weather, climate and Earth Systems modelling necessary for Australia to navigate environmental change and remain prosperous and safe
- Enable new research in water and carbon management, ecology, air pollution, agriculture, public health and more to integrate their research into a sustainable national simulation system
- Accelerate discovery and the production of international high-impact publications that underpin ongoing leverage of overseas innovation back into Australian research
- Deliver an environment for researchers in exascale computing, and exascale data analytics to take advantage of and accelerate the national capability in these areas that are emerging from transformations in High Performance Computing (HPC) technology
- Accelerate research in support of policy makers at the forefront of economy-wide grand challenges including disaster risk reduction, emergency management, health risks, emergent disease, water security, agriculture, urban sustainability, and more.