Online submission

28 October 2024

Australian Academy of Science submission on the
***National Digital Research Infrastructure (NDRI) Investment Plan Environment Scan* consultation**

Strategic investment in high-performance computing and data infrastructure (HPCD), including exascale capability, is vital to secure Australia's research capability and ability to meet national and regional priorities into the future.

The Academy recommends that the NDRI Investment Plan articulates a plan to acquire and sustain next generation supercomputers, for the development of Australia as a hub for exascale capability in the Asia-Pacific region – including developing a national supercomputing strategy and committing to necessary scoping studies.

In 2023 the future computing needs of Australia's science sector were discussed at a roundtable convened by the Australian Academy of Science. Its findings are summarised in the policy brief: "The future computing needs of the Australian science sector".

The existing demand for Australian HPCD systems far exceeds our supply, with both of Australia's Tier-1 facilities, NCI Australia based in Canberra and Pawsey Supercomputing Research Centre situated in Perth, being oversubscribed and ageing rapidly. HPCD has a wide range of users, including universities and research organisations, government departments and science agencies, industry and international researchers. Demand and capability needs will continue to increase.

Exascale computing holds the ability to solve calculations five times faster than today's top supercomputers.[1] As of December 2023, 'Frontier' was the world's fastest supercomputer with exascale capabilities. The United States (US) based computer cost US taxpayers $600 million USD to build. Following its release, several more machines were announced for 2024 in Europe and the US.

Exascale computing capability will transform science and is vital to ensure that Australia is not left behind in accessing the benefits of high-performance computing. This capability will keep our science sector internationally competitive, attractive for investment and talent acquisition, and will enable homegrown solutions to our unique domestic challenges. Hosting an exascale capability for the Asia-Pacific region would position Australia as a leader and deliver an important strategic, diplomatic asset to enable regional problem solving.

The significant benefits and opportunities for Australia to utilise this capability cannot be understated. For example, exascale capability would enable more reliable and faster climate predictions, better representations of extremes, and a finer spatial scale to enhance climate scenarios, disaster preparedness and inform response strategies. These higher-resolution climate models allow us to answer critical policy and planning questions, such as locations of renewable infrastructure to build upon energy supply and flood management. Without this capability, our national resilience and intervention ability for extreme weather events and emergencies will be compromised.

To discuss or clarify any aspect of this submission, please contact Mr Chris Anderson, Director Science Policy at Chris.Anderson@science.org.au.

[1] Oak Ridge National Laboratory. Frontier. https://www.olcf.ornl.gov/frontier/#2.