ATSE action statement

Made in Australia: Our AI opportunity

Australian Academy of Technological Sciences & Engineering

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Our AI opportunity

Artificial intelligence (AI) is radically reshaping work, education and security in Australia, and is officially recognised as a critical technology in government policy. How we harness it will impact the nation's economic prosperity, national security and continuing innovation.

The global race to build AI capabilities is accelerating, and it is incumbent on us to harness our comparative advantages and secure control of our data and digital systems. Without timely and comprehensive public and private investments in sovereign AI capability, Australia runs the risk of becoming dependent on foreign technology providers with their own commercial and national interests.

Australia already has the ingredients to develop sovereign AI capability, and is ready to leverage these, with appropriate government leadership and investment. ATSE proposes a mission-based approach, with AI factories[1] located across Australia: the jewel in the AI crown around which talent and partnerships will develop. This statement outlines how targeted investment in a strong national AI capability can position Australia as a global leader in safe, sustainable, ethical and high-impact sovereign AI. It shows how these investments will give us the autonomy we want as a nation whilst enhancing productivity and prepare the nation for future transitions in manufacturing and knowledge work, unlocking value across the entire economy.

This statement builds on ATSE's 2022 vision statement, *Strategic Investment in Australia's Artificial Intelligence Capacity*.

1 An 'AI factory' is a dedicated facility to accelerate the development, training and scaling of AI technologies. It includes high-performance computing infrastructure and data storage capabilities. The facilities are co-located with research institutions and innovation precincts.

What is sovereign AI?

Australian sovereign AI means AI capability developed, publicly owned, operated and controlled by Australians, powered by local talent and sustainable computational power, ensuring that Australia retains strategic control and the ensuing economic benefits. This would enable Australia to have agency over its AI future while also engaging strategically with international collaborators.

It is much more than hosting foreign-owned data centres onshore – it is about investing in people, technology and facilities that align with Australia's national interests and values.

As the Australian Government considers how to harness AI for productivity growth, it faces a choice: whether to build sovereign capability or to rely on private investments, largely from foreign-owned companies. If all nationally significant AI facilities are built and controlled by global tech companies, Australian researchers, SMEs, government departments and public institutions would face restricted access (e.g. through a reservation scheme), higher costs due to demands on facilities, and limited influence over standards and governance – significantly limiting the long-term benefits to the nation in productivity gains and onshore capabilities.

An AI Mission for Australia

Australia's existing computing facilities are vital for scientific research, but they were not designed for the demands of AI model development. ATSE's analysis (see *Gap analysis of computing infrastructure in Australia*) identifies limitations in compute power, model training capacity, and commercial access, particularly for startups and small and medium enterprises (SMEs). We can act now to secure fit-for-purpose AI infrastructure that leverages national assets and builds long-term productivity growth.

A scalable sovereign capability to develop, train, govern and deploy AI models is not just made up of physical facilities, but is rather a national mission that ensures Australia's digital sovereignty and security[2]. Achieving this mission includes physical and digital infrastructure, skilled talent, unique datasets, responsible governance, and commercial pathways[3]. The following illustration outlines the AI mission for Australia, building on the world-recognised framework for mission-driven economies.

Australia's advantage

Australia already possesses many comparative advantages and investments to develop sovereign AI capability, including:

- High-quality, nationally significant sovereign datasets (see *Analysis of Nationally Significant Datasets*)
- Deep research expertise[4]
- High-value public/private enterprises
- Ethical governance frameworks, including for Aboriginal and Torres Strait Islander data governance
- Digitally literate workforce
- Abundant resources for renewable energy generation to power data centres
- Climate credentials and strong corporate governance, including legislated climate-related financial disclosures to enable the development of an ethical and environmentally sustainable AI industry
- Strategic connectivity via undersea cable links to Europe, Asia, and America
- Leadership in quantum computing
- Geopolitical stability, democratic governance, and commitment to human rights

Australia's abundant renewable energy resources position us to develop our own world-class AI infrastructure and sustainable data centres which require a reliable and cost-effective energy supply to power their intensive computing operations. By investing in sovereign capability, owned and operated by Australians, we can maintain our competitive advantage and offer sustainable compute capacity to international markets. Investing in our own AI infrastructure ensures that Australia retains control over our critical data and technology, protecting our national interests and avoiding dependence on foreign-owned facilities.

2 A mission-oriented approach, as outlined by Marianna Mazzucato (2021), involves a government defining a grand societal challenge, consolidating and coordinating efforts towards this goal. This approach redefines the government as an active shaper of markets and value, working alongside the private sector, rather than only intervening in the case of market failures.
3 A mission-based approach to AI has also been advocated by the Business Council of Australia in *Accelerating Australia's AI Agenda*.
4 Details are outlined in the National AI Centre report on *AI growth and opportunities*.

Australia also has a unique opportunity to lead in the development of nimble, high-impact sovereign AI capability that is scalable, trustworthy and aligned to national priorities. In addition to developing the capacity to build and train a foundation model, there will be opportunities for Australia to create distinctive AI applications such as sparse-data AI for remote communities, trusted AI for government service delivery, or climate AI for adaptation modelling. Australia's advantage lies in the strategic use of its nationally significant datasets, which are high quality, trusted, and purpose built over decades of public investment. These datasets provide the foundation for scalable, safe and economically efficient sovereign AI systems in niches that can deliver productivity gains and export value (see Analysis of Nationally Significant Datasets). This follows the *Productivity Commission's 2024 recommendation* to leverage Australia's comparative advantages to develop AI capability. Australia can continue to engage in partnerships with international tech companies while also investing in sovereign AI capabilities for public benefit, particularly where there are distinct advantages or requirements.

Tech companies have demonstrated their interest in investing heavily in Australia, suggesting there is a high-value commercial opportunity. For example, Amazon has recently *announced* they will expand their data centres in Sydney and Melbourne at a cost of $20 billion. In 2023, Microsoft committed to $5 billion to build data centres in Australia. These investments demonstrates the scale of the opportunity, and highlights the need for home-grown capabilities with benefits flowing to the Australian public[5].

Without strategic public investment, **Australia risks sending our comparative advantages offshore**. Australia also risks becoming dependent on foreign technologies, AI infrastructure and governance models, and losing control of our sovereign data and the value it inherently offers.

Investments in building sovereign AI will accelerate AI adoption, enable public-private collaboration, encourage innovation in SMEs, and create jobs and opportunities for start-ups, while delivering safe, ethical, commercially viable and globally competitive AI across the entire economy. These productivity gains and the associated workforce uplift will have an enduring impact on social prosperity and living standards.

Additionally, it is highly likely that the future of our national security and defence infrastructure will require significant sovereign AI capability to safeguard the nation. It is critical to strengthen protections against foreign interference, cyber threats and adversarial AI-led attacks, and ensure Australia retains full control over sensitive data and critical decision-making. Investment in sovereign AI infrastructure not only addresses our immediate national security needs, but also forms a foundational step in building the skills required for future quantum computing sovereignty, critical for long-term data security and technological autonomy. By investing now, Australia lays the groundwork for AI systems that are secure, sovereign and aligned with national interests – reinforcing our leadership in the global digital economy and retaining the talent to be at the leading edge of the sector.

5 This has also been explored in the Kingston Group's paper on *Australia's AI Imperative*.

Potential benefits for key sectors

AI — including machine learning, deep learning and large language models — is already transforming the economy, for example:

- In **health**, it is improving diagnostics and drug discovery (e.g., AlphaFold Protein Structure Database, Med-PaLM medical large language model).
- In **emergency management**, it complements traditional simulation to enable real-time damage assessment and bushfire prediction (e.g. CSIRO's *Spark*).
- In **business**, AI enhances productivity, safety and energy optimisation.

Anticipated AI-powered developments in key sectors, leveraging Australia's datasets, could include:

- **Defence:** advances in autonomous systems, ISR (intelligence, surveillance, reconnaissance), and cyber capabilities, aligned with *Defence Science and Technology Group* objectives.
- **Health:** improvements in diagnostics, genomics, imaging and monitoring leveraging existing investment through the *Medical Research Future Fund*.
- **Education:** enable personalised teaching and learning applications, streamline administrative tasks, and support assessment and real-time feedback.
- **Environment:** enhanced weather forecasts, climate modelling, geohazard detection, ecosystem monitoring, and disaster prediction and preparedness. AI will also support food and water sustainability, and ensure economic benefits from Australia's mineral and renewable energy resources[6].
- **Built environment:** improve built environment delivery and management through Infrastructure 4.0 technologies, digital twinning, smart sensing and structural health monitoring.
- **Financial Services:** enhance fraud detection, risk assessment and regulatory compliance through advanced models and real-time monitoring. AI will drive innovation and efficiencies in personalised financial products and advisory services, supporting the growth of Australia's fintech ecosystem.
- **Manufacturing:** enable predictive maintenance, quality control and supply chain optimisation, boosting productivity and global competitiveness. Integration with Industry 4.0 and Edge AI technologies will support smart factories, advanced robotics and mass customisation, aligning with *Future Made in Australia* priorities.
- **Energy:** enable optimisation, safety enhancements and emissions reduction — contributing directly to Australia's economic and sustainability agendas.
- **Mining:** accelerate mineral exploration, resource characterisation and operational efficiency through AI-driven geospatial analysis, sensor integration and predictive maintenance. Support sustainable practices, worker safety and value-chain optimisation, aligning with Australia's Critical Minerals Strategy and global decarbonisation goals.
- **Quantum computing:** contribute to solving challenges in quantum computing development such as algorithm efficiency and error correction. Cross-pollination between quantum computing and AI could also lead to more powerful AI models.

6 See Australian Academy of Science's 2018 decadal plan *Our Planet, Australia's Future: A decadal plan for Australian geoscience 2018–27*.

The case for AI sovereignty

Beyond the potential benefits of sovereign AI capability, sovereign capabilities can also help mitigate risks. AI sovereignty will help safeguard our national interests, develop technologies tailored to local conditions, and protect our data, infrastructure and democratic processes. Without this sovereign capability, Australia risks losing influence over key decisions about how these technologies function. The rationale for pursuing AI sovereignty includes:

- **National interest:** Overseas tech companies developing AI might be more focused on advancing their national agendas than supporting Australia's priorities. This could mean decisions made using these technologies don't align with what's best for Australians, our context or our future. AI developed overseas may naturally reflect the values, norms and commercial interests of its country of origin, which might not be consistent with Australia's. Sovereign AI would enable Australia to maintain control over AI applications that serve our nation and region.
- **Lack of local customisation:** AI built for overseas markets may not be suited to the unique environmental, regulatory or economic conditions in Australia. This is particularly evident in sectors such as agriculture, where Australia's climate, soil, and market conditions differ from other countries, and healthcare, where the structure of the system, population needs, and the health of Aboriginal and Torres Strait Islander communities require tailored approaches and specific sovereign data.
- **Narrowing tax base:** For internationally owned AI services that operate within Australian borders, the majority of their value – such as intellectual property and software licensing – is monetised overseas. This creates a digital sovereignty gap where Australia bears the infrastructure and compliance burden but gains only minimal tax revenue. As AI increasingly becomes part of our economy, this has long-term consequences for Australia's productivity.
- **Data misuse risks:** When we use AI developed offshore, we often hand over sensitive data. This raises serious privacy concerns – companies might store, analyse or sell Australian data in ways that don't comply with our standards or laws.
- **Interference risks:** Overseas-developed AI systems might contain mechanisms that could subtly influence public opinion, decision-making or democratic processes in Australia without our knowledge. Conversely, sovereign AI could enhance the resilience and security of critical infrastructure.
- **National security risks:** When it comes to defence applications, trusting AI systems developed overseas is a major risk. For national security, relying on our own trusted, sovereign systems is essential.

Building Australia's AI Future

Five key drivers are critical to accelerating Australia's AI capability:

1. **Skilled workforce:** Building the talent pool of skilled workers, professionals and researchers who build, operate, maintain and use these facilities. The proposed investment in workforce capability aligns with the Department of Education's work on the *National Research Infrastructure Workforce*.
2. **Leading research:** Empowering the research sector to undertake high-risk, high-impact, cutting-edge research with strategic international linkages and multi-sectoral collaborations. This will drive scenario planning for the skills, capabilities and infrastructure required in future technologies and systems that safeguard the nation. Equally important will be vendor-neutral tooling and platform layers for AI model tuning and testing, simulation environments, and robust evaluations for safe and responsible AI models and systems.
3. **High-performance AI infrastructure:** Setting up purpose-built, renewables-powered dense GPU clusters for AI training and inference, complementing and leveraging scientific computing workloads from existing high-performance computing (HPC) facilities.
4. **Shared national datasets:** Activating secure, distributed repositories hosting Australia's most critical datasets across sectors such as health, environment, minerals, agriculture and defence. Investment to curate the datasets will ensure the data is suitable for building AI models. Establishing a sovereign data framework will guide the management of this data with strong privacy and cybersecurity practices at the core.
5. **Commercial pathways:** Enabling startups, SMEs, large companies and academia to innovate and collaborate with leading edge research through AI-focused accelerators, agile IP commercialisation, and access to shared compute facilities. This would accelerate the work in progress at many SMEs and large companies developing their AI capabilities.

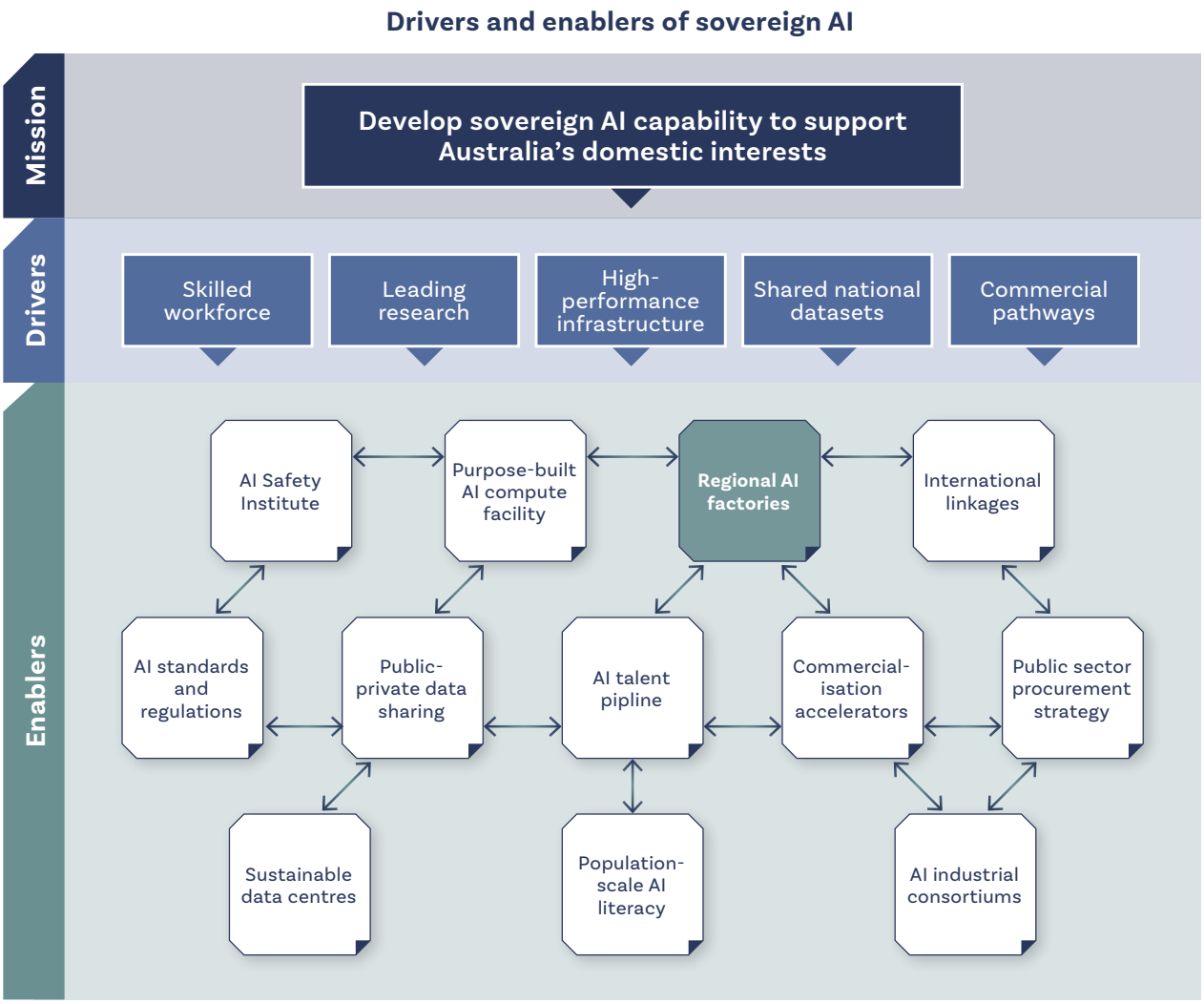

Figure 1. Australia's AI Mission: The key drivers and enablers required to develop a functional, independent, scalable and sustainable sovereign AI capability for Australia.

A distributed AI factory model for national capability

The proposed investment ranges from **$4.5 billion to $5 billion over five years.** This is structured around the development of Australian Government-owned AI factories in partnership with state and territory governments. The anticipated timeframe for full deployment and operational maturity is **three to five years**, allowing for the rapid establishment of AI infrastructure along with partnerships, build-up of capability and delivery of initial outputs, and scaling of trustworthy AI across public/private enterprises alongside an AI literate consumer population.

Such an investment would allow for 5-7 AI factories as the centrepiece of this strategy[7]. AI factories would be Government-funded hubs with high-performance computing and data storage capabilities, providing a base for developing sovereign AI capability explicitly for the benefit of the Australian public. The AI factories would be integrated with Australia's universities and industrial base, enabling real-time access for SMEs, startups, researchers and government. Intellectual property generated through publicly funded AI research and collaborations within the AI factories can be strategically managed to ensure significant public benefit while supporting non-government users to retain ownership. The facilities embedded and accessible to the AI factories will support both domain-specific model development and real-time inference workloads, enabling Australia to respond rapidly to public sector and industry challenges. AI factories can be the key enablers for capability building, job creation and retention through expert AI workforce training, PhD placements programs, research-industry mobility fellowships and research translation to accelerate commercial pathways.

Supporting initiatives

In addition to AI factories, other proposed initiatives include:

- **Purpose-built AI compute facility:** While investments in ultra-powerful supercomputing remain critical for scientific research, they are not sufficient to meet the demands and proposed scale of AI development. Australia's current HPC systems require upgrading and are not designed for large-scale AI model training or real-time, iterative workloads. The proposal sits alongside the *Australian Academy of Science's call for investment* in what would be the southern hemisphere's first state-of-the-art exascale high-performance computing and data (HPCD) capability. The potential for co-location of proposed AI factories with existing HPC centres could be explored, leveraging existing investments in these facilities.
- **AI talent pipeline:** As noted by the joint *Learned Academies' rapid report on Generative AI*, workforce shortages and competition are inevitable short-term risks during AI development and adoption. However, AI leads to new job categories and skills. The best strategy to manage these risks is to improve population-scale AI literacy. New, attractive tech jobs, AI credentialling and skill development can be embedded across all education levels, research training, and lifelong learning. Developing the AI skills pipeline can occur alongside programs to attract top global talent and incentivise the return of Australian experts working in overseas markets. Robust research and industry, including through the AI factory model, would be a key driver of attracting and retaining talent.
- **AI Safety Institute:** An AI Safety Institute will assess and support the safety of AI models and undertake research and standards development for AI technologies. Functions will include adversarial testing, bias audits, safety benchmarking, and training on AI ethics, safety, standards, and regulatory compliance. This work will directly inform the operations of the proposed AI factories. The AI Safety Institute will enable Australia to fulfil its obligations under the *Bletchley* and *Seoul* Declarations to identify and manage AI safety risks. This Institute will interface with other government bodies such as the Australian Cyber Security Centre. To guarantee its independence and credibility, the AI Safety Institute should be a standalone Commonwealth entity separate from the Department of Industry, Science and Resources (DISR).
- **AI standards and regulations:** Building on the work in progress, if done well, these will speed up and provide certainty and support for business, and interface with international standards development committees.
- **Support commercialisation:** Implementing strategies for institutional reform, as outlined in ATSE's *Boosting Australia's Innovation* report. This could include public sector procurement strategies, leveraging and supporting innovation networks such as accelerators, and engaging with international partners to innovate and standardise.

7 This follows the approach of the EU's *AI Continent Plan*, in which computing infrastructure including a network of AI factories are the primary driver.

A blended investment model for AI with Commonwealth Government leadership is key to delivering this vision. **Federal funding programs**, including the National Reconstruction Fund, the Medical Research Future Fund, ARC major cross-disciplinary linkage schemes, and the Cooperative Research Centres Program, offer a solid foundation and could initiate AI-specific funding rounds. **State and territory governments** – particularly those with digital innovation precincts – can support AI factory development and the localisation of AI capability. Private sector partnerships, such as those fostered by the Australia's Economic Accelerator program, will be crucial. Global technology entities' infrastructure, platforms and real-world deployment expertise would then be part of a broader AI ecosystem.

Australia has the comparative advantages enabling us to become a leading AI nation, driving productivity growth and living standards in the coming years. Government investments in the right mission will guide Australia to realise this potential. ATSE stands ready to provide independent, evidence-based, expert advice to assist decision-makers to act on Australia's AI opportunity.

Investment timeline

A world-class sovereign AI capability is more than data centres and compute clusters. The table below presents representative activities and deliverables across the investment tiers that would be necessary to realise the AI Mission presented in Figure 1. The cost estimates have been developed in consultation with industry experts, and are comparable to investments made by peer countries (see *Global Benchmarking*).

Investment Tier	Scope and Deliverables
Establish ($1-2B) **Year 1-3**	**Workforce and Capability:** • 5-7 Australian Government owned AI factories with critical mass of researchers, industrial base, SMEs, startups and government • AI engineers recruitment for national AI compute facilities • Incentivise attraction and retention of talent • AI Safety Institute with team for AI safety and ethics training • Commercial leads and partnerships with research sector • National media and awareness campaigns
	AI Infrastructure: • AI Supercomputing hub (initially 5,000-10,000 GPUs; this may need to be upgraded in the future as technologies progress) • Integration with National Computational Infrastructure, Pawsey, and state data centres • National Trusted Data Lake (multi-sector) • Secure cloud for critical infrastructure > Fast-tracked planning and environmental approvals for sovereign AI infrastructure
	Governance & Ecosystems: • Certainty in AI regulation and standards • Agile public-private data sharing framework with key national datasets securely governed for collective benefit • Commercialisation precinct co-located with AI factories • Public Sector sovereign AI procurement • Universalising best practices for governance and data sovereignty, including Aboriginal and Torres Strait Islander data

Investment Tier	Scope and Deliverables
Scale ($2–3B) **Year 4-5**	**Workforce and Capability:** • Population-scale AI literacy programs • Cadetships, scholarships, tertiary pathways and micro-credential programs • Research Industry mobility AI fellowships • Cross-sector PhD programs with industry placement • Program to attract global talent to Australian AI industry
	AI Infrastructure: • Top-10 global AI supercomputing facilities • Platforms for foundation model training and domain-specific sovereign models in areas of national priority • AI factories to be capable of sovereign inference • AI testbeds and regulatory sandboxes
	Governance & Ecosystems: • AI Factories publicly owned with access and IP arrangements for researchers, SMEs and industry users • MOUs with EU, UK, Singapore, Korea • Co-located venture funds • Commercialisation accelerators • AI industrial consortiums with global partners

Global benchmarking: How do we compare?

Other countries are rapidly scaling their sovereign AI capabilities with major public investments:

Place	Amount	Time period	Topic	Announcement date
Taiwan	NT $200 billion (AUD $10.53 billion)	2025-28	AI projects to become an "AI Island"	June 2025
South Korea	USD $2.9 billion (AUD $4.54 billion)	Before 2030	Build an AI supercomputing hub by 2030	December 2024
EU	€1.3 billion+ (AUD $2.31 billion+)	2025-27	Artificial Intelligence, cybersecurity and digital skills	March 2025
Canada	CAD $2 billion (AUD $2.25 billion)	2024-2029	AI infrastructure investment including CAD $1.3 billion of public infrastructure available to Canadian SMEs	April 2024
Singapore	SGD $500 million (AUD $595 million)	2024-2029	Acquire computer chips to support AI development and support scholarships for AI Masters students	February 2024
Hong Kong	HK $3 billion (AUD $590 million)	2024-2027	3-year AI subsidy scheme to help eligible users (government, research, start-ups) access AI supercompute.	October 2024

These investments demonstrate an understanding of the need for government-owned and controlled AI capabilities, complementing and providing a local alternative to Big Tech investments.

Appendix: Our nationally significant datasets

Dataset	Sector	Access	Description
Medicare Benefits Schedule (MBS) & Pharmaceutical Benefits Scheme (PBS)	Health	Restricted (research application)	Detailed records of medical services and prescriptions subsidised by the Australian Government.
My Health Record	Health	Restricted (controlled by ADHA)	Digital summary of individual health information including immunisations, medications, and pathology results.
Australian Immunisation Register (AIR)	Health	Restricted	National register recording vaccines administered in Australia.
National Hospital Morbidity Database	Health	Restricted (via AIHW)	Records of hospital separations across Australian hospitals, including diagnosis and procedure codes.
Australian Bureau of Statistics (ABS) – Census & Labour Force Data	Demographics/ Economy	Public (some restricted microdata)	Core datasets on population, housing, education, income, employment, and labour markets.
Household, Income and Labour Dynamics in Australia (HILDA) Survey	Social Science	Restricted (Melbourne Institute application)	Longitudinal household survey of income, employment, health, education, and family dynamics.
National Disability Data Asset (NDDA)	Health/Social Policy	Restricted	Integrates health, education, employment, and disability support datasets across jurisdictions.
Geoscience Australia – National Geospatial Data	Geospatial/ Environment	Public	National topography, satellite imagery, seismic, and resource mapping datasets.
Australian Geoscience Data Cube (AGDC)	Climate/Remote Sensing	Public	Processes large volumes of satellite imagery for land, water, and environmental monitoring.
Bureau of Meteorology (BoM) Observational and Forecasting Data	Weather/Climate	Public and Restricted	National weather observations, radar, and forecasting models.
National Environmental Satellite Data (via BoM and GA)	Climate/Remote Sensing	Restricted/Public (derived products)	Environmental monitoring from satellite platforms (e.g., Himawari-9, NOAA).
CSIRO Climate and Earth System Model Data	Climate Research	Restricted/Public (CSIRO Data Access Portal)	Global and regional climate modelling outputs.
National Environmental Science Program (NESP) Climate Systems Hub Data	Climate/ Environment	Restricted/ Collaborative	Data supporting emissions projections, climate risk, and ecosystem resilience modelling.
Data.gov.au	Multi-sector	Public	Central repository for open datasets across all levels of government.
Joint Operational Command and ISR Data (ADF Net)	Defence	Highly Restricted	Integrated operational mission and surveillance data for Defence.
Geospatial Intelligence Data (AGO – Australian Geospatial-Intelligence Organisation)	Defence/ Geospatial	Highly Restricted	Classified satellite and aerial intelligence imagery and terrain analysis.
Defence Science and Technology Group (DSTG) Experimental & Simulation Data	Defence/ Research	Restricted	Simulation and wargaming data for autonomous systems and experimental technologies.
Defence Health and Personnel Systems (e.g., PMKeyS, Defence eHealth)	Defence/Health	Restricted	Data on ADF personnel health, medical history, and readiness.
Australian Signals Directorate (ASD) Cyber Threat Intelligence	Cybersecurity/ Defence	Highly Restricted (TOP SECRET/SCI)	National-level cyber threat and network monitoring intelligence.
Australian Real-Time Macroeconomic Database	Economic	Public (Reserve Bank of Australia)	Historical and real-time macroeconomic indicators including GDP, inflation, employment, and interest rates.
ABS International Trade Data	Economic	Public	Detailed exports and imports data by commodity and destination region.
Resources and Energy Quarterly	Economic/ Resources	Public (Department of Industry, Science and Resources)	Forecasts and historical trends for Australia's major resources and energy commodity exports.

Dataset	Sector	Access	Description
CEIC Data – Exports by Commodity	Economic	Subscription-based	High-frequency detailed commodity export values and trends.
Australian Renewable Energy Mapping Infrastructure (AREMI)	Energy/Spatial	Public	Spatial datasets supporting renewable energy development (wind, solar, hydro, biomass) nationally.
Australian Energy Statistics	Energy	Public	Australia's national energy consumption, production, and trade data.
Australian Energy Resources Assessment (AERA)	Energy	Public	Comprehensive national resource inventory for fossil and renewable energy.
National Road and Rail Datasets	Transport	Public (Geoscience Australia)	National road and railway network data layers.
Australian Infrastructure Statistics – Transport Sector	Transport	Public	Spatial and statistical data from Infrastructure Australia including road, rail, port and airport assets.
National Airports and Airfields Dataset	Transport	Public (Airservices Australia, GA)	Locations and features of public and private airfields across Australia.
Aviation Statistics (BITRE)	Transport	Public	Airline passenger volumes, cargo volumes, airport traffic movements.
Water Data Online	Water	Public (Bureau of Meteorology)	Current and historical river height, streamflow, and groundwater data across Australia.
Australian Water Observations from Space (WOfS)	Water/Remote Sensing	Public (Geoscience Australia)	National scale satellite-derived water extent observations over time.
ACCC Mobile Infrastructure Report – Data Release	Telecoms	Public	Data on mobile tower infrastructure, blackspots, and coverage across Australia.
Infrastructure Australia Data – Telecoms	Telecoms	Public	Telecommunications infrastructure, broadband rollout progress, and blackspot mapping.
Australian Mineral Deposits Database	Mining	Public (Geoscience Australia)	Geospatial database of over 1,000 major mineral deposits across Australia.
Australia's Identified Mineral Resources (AIMR)	Mining	Public (Geoscience Australia)	Annual national resource estimates for critical and strategic minerals.
OZMIN Database	Mining	Public (Geoscience Australia)	Historical data on mines, mineral deposits, and production information.
1 Second SRTM Digital Elevation Model (DEM)	Geospatial	Public	National-scale elevation dataset derived from NASA's Shuttle Radar Topography Mission (SRTM).
5 Meter DEM (LiDAR Derived)	Geospatial	Public (State agencies/GA aggregation)	High-resolution elevation models used for flood mapping, land-use planning, and engineering design.
National Land Parcel Boundaries	Land/Property	Public (PSMA Australia)	National aggregation of land parcel and strata title boundaries.
Digital Atlas of Australia	Multi-sector/ Spatial	Public (Geoscience Australia)	Integrates cadastral, environmental, infrastructure, and land-use datasets for decision support.

Appendix: Gap analysis of computing infrastructure in Australia

Aspect	Power Computing Systems	High Performance Computing (HPC) Systems	High Performance Computing for Artificial Intelligence (AI-HPC) Systems (excludes production inference)	National Gap	Amazon Web Services (AWS)	NECTAR – ARDC National Research Cloud
Primary Use Case		Numerical simulations (e.g. climate, physics, genomics).	AI model training, fine-tuning, and inference at scale.	No dedicated computing infrastructure for training foundation models or domain-specific models (e.g. for health, defence, or Australian language).	Generic cloud offering, limited focus on sovereign capability or public-good AI.	Supports small-scale experimentation; not GPU-scale or production-grade.
Examples	Katana (UNSW), MASSIVE (Monash), Spartan (UMel).	Gadi, Setonix, OzStar.	Capella (Dresden University of Technology), many proprietary and commercial systems.		AWS EC2 (P4d, P3, G5 instances), Amazon SageMaker, AWS ParallelCluster.	Melbourne, Monash, Queensland Cyber Infrastructure Foundation nodes.
Compute Architecture	Heterogeneous – a mix of nodes with different architectures that include CPU-only nodes and CPU+GPU nodes of different architectures, generations and memory sizes.	Homogeneous - massively parallel primarily CPU architecture; tightly coupled compute nodes designed for large-scale numerical computations sensitive to load imbalances. GPU acceleration is used moderately.	Dense GPU clusters optimised for highly parallel concurrent matrix computations.	No national-scale GPU cluster accessible to public researchers and industry (e.g. 10,000+ GPU-class system).	Highly flexible - variety of instance types from CPU-only to GPU-optimized with various memory configurations; elastic capacity based on demand.	Commodity server architecture, mostly CPU, limited GPU at Monash and Queensland Cyber Infrastructure Foundation nodes. Mostly OpenStack, but advanced options are not available. Small GPU section at Monash node is managed via Slurm providing National AI/ML research services (MLeRP).
Access Model	Capital expenditure with fixed operational costs; institutional resource sharing.	Academic researchers via peer-reviewed grants. High capital expenditure; fixed operational costs.	Flexible access for industry, startups, researchers; usage-based or collaboration-driven. High capital expenditure; specialised hardware investments; fixed operational costs.	No commercial or startup-friendly access pathway to national compute for AI training and inference.	Pay-as-you-go pricing; no upfront capital expenditure; variable operational costs based on usage; options for cost optimisation through reserved instances and spot pricing.	ARDC (NCRIS) funded capital expenditure. Partial operational cost recovery for the host institutions. National service is free for researchers.
Scalability	Limited by physical infrastructure; scaling requires procurement cycles.	Fixed capacity with periodic hardware refreshes; scaling limited by physical infrastructure.	Fixed capacity specialised for AI workloads; scaling requires significant investment.	No elastic or scalable public AI infrastructure; reliance on global cloud platforms (OpenAI, AWS, Google).	Virtually unlimited on-demand scalability; capacity can be adjusted in minutes; global infrastructure availability.	Limited scalability available within an allocation.

Aspect	Power Computing Systems	High Performance Computing (HPC) Systems	High Performance Computing for Artificial Intelligence (AI-HPC) Systems (excludes production inference)	National Gap	Amazon Web Services (AWS)	NECTAR – ARDC National Research Cloud
Human Resources/ Maintenance	In-house IT staff with job schedulers knowledge required; regular hardware maintenance and updates.	Dedicated HPC and data specialists required; complex system maintenance.	Specialised AI-HPC administrators required; complex hardware and software stack maintenance.	Talent pipeline for AI infrastructure (e.g. MLOps, deployment, monitoring) is underdeveloped and not funded.	Infrastructure maintained by AWS; reduced administrative overhead; automatic updates and security patches for managed services.	In-house IT staff with OpenStack knowledge required; regular hardware maintenance and updates.
Interconnect	Commodity network; moderate to variable network latency; no specific attention to the network topology.	High-bandwidth (e.g. InfiniBand), low-latency network (e.g., InfiniBand); optimised for parallel processing and inter-node communication.	High-speed interconnects optimised for low latency and rapid GPU-to-GPU data transfer (e.g. InfiniBand, NVLink).	Existing systems lack optimised GPU interconnects needed for LLM-scale AI training.	Multiple options - standard network for general workloads, Elastic Fabric Adapter (EFA) for HPC applications, AWS Cluster Networking for tightly coupled workloads; AWS Nitro System for high-performance virtualisation.	Generic Ethernet switches. No specific topology. Latency between VMs is inconsistent.
Storage Design	Typically, mixed storage architectures and technologies optimised to broad institutional requirements.	High-performance parallel file system.	High-performance parallel file systems optimised for I/O, often fully or partially based on NVME.	Limited public infrastructure to store and serve sovereign unstructured datasets (e.g. medical imaging, video, text). *Some infrastructure* is being developed for medical research data.	Tiered storage options - S3 for object storage, EBS for block storage, FSx Lustre for high-performance computing, EFS for shared file systems; all with varying performance tiers.	Generic disk-based storage generally unsuitable for data intensive computational applications.
Resource Allocation	Batch job scheduling; managed queues and policies; non-elastic (Slurm, PBS).	Batch job scheduling; managed queues and policies; non-elastic (Slurm, PBS).	Dynamic, real-time; elastic GPU allocation; supports longer project allocations for iterative model training and continuous access (Apache Spark).	No real-time or flexible allocation system for AI workloads; queue times unsuitable for iterative AI development.	On-demand, reserved, and spot instances; auto-scaling capabilities; serverless options (AWS Lambda, AWS Fargate); managed service options (SageMaker) with automatic resource allocation.	OpenStack, reserved, auto-scaling is possible via K8s within a granted project allocation.

Aspect	Power Computing Systems	High Performance Computing (HPC) Systems	High Performance Computing for Artificial Intelligence (AI-HPC) Systems (excludes production inference)	National Gap	Amazon Web Services (AWS)	NECTAR – ARDC National Research Cloud
Workloads	Typically, single-node jobs, or embarrassingly parallel jobs, are often interactive jobs for development, visualisation, and data analysis.	Large-scale computer simulations and modelling (weather, climate, physics, computational fluid dynamics, engineering simulations, etc).	AI model training and non-interactive inference on large amounts of data.	No infrastructure tuned to short-cycle, interactive AI workloads; current systems penalise experimentation.	Highly diverse - supports everything from microservices to large-scale data processing, ML model training and inference, HPC simulations, web applications, and databases.	Virtual laboratories, web portals, auxiliary services, software development VMs.
User Interaction	Highly interactive; real-time, self-service access.	Batch processing; interactive use is discouraged.	Generally non-interactive.	Researchers and startups lack real-time, user-friendly interfaces on public infrastructure for AI development.	Multiple interfaces - console, CLI, SDK, APIs; both interactive (Jupyter notebooks in SageMaker) and batch processing; programmatic access and workflow automation.	Multiple interfaces - console, CLI, SDK, APIs for automation. Users deploy their own software stacks for both interactive and batch processing.
Typical Research Applications	Collaborative research, interactive computational environments, prototype development, small-to-medium-scale analytics.	Climate modelling, astrophysics simulations, fluid dynamics, computational chemistry.	Structural biology (AlphaFold), medical imaging, autonomous systems, robotics, natural language processing.	Australia lacks large-scale domain specific AI models due to limited compute and funding and must rely on proprietary models from multinational tech companies.	Full spectrum capabilities - from development and testing to production deployment; scalable data analytics, AI research, genomics, financial modeling, IoT analytics, and serverless applications.	Small-scale data analysis, research collaboration web-site or portal hosting, virtual laboratories.
Security & Sovereignty		Open science model, limited for restricted datasets.	Requires secure data governance, red-teaming, fine-grained access control.	No publicly owned and accessible infrastructure compliant with data sovereignty or red-teaming protocols for high-risk AI systems.	Subject to foreign jurisdiction; data sovereignty risks.	No capability for sovereign dataset.

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