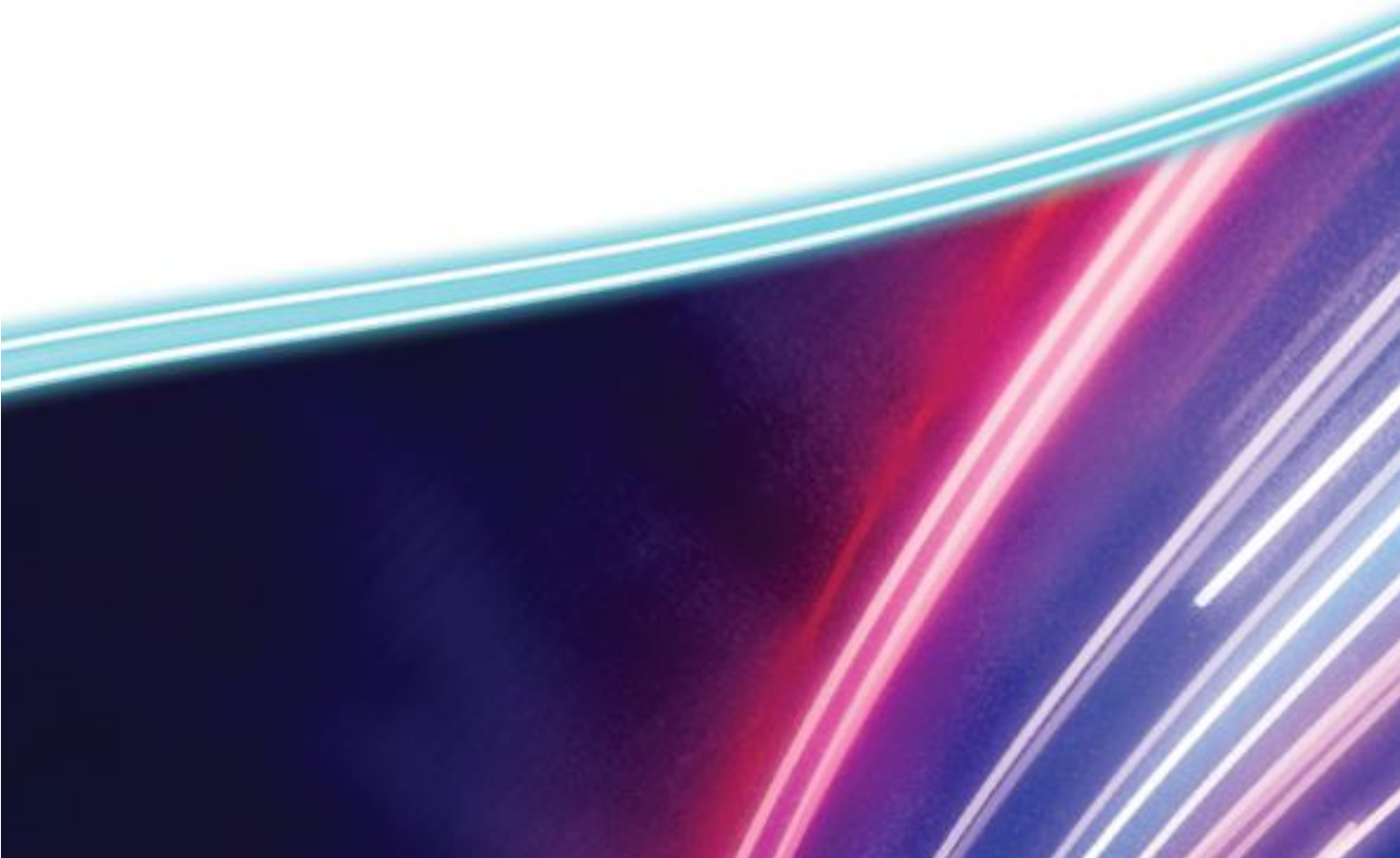
GOVERNMENT OF WESTERN AUSTRALIA

Department of
Jobs, Tourism, Science and Innovation

Western Australia's 10 Year Science and Technology Plan

Phase One Consultation Findings Report



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1. Background

The Department of Jobs, Tourism, Science and Innovation (JTSI) is leading the development of a 10 Year Science and Technology Plan (The Plan) for Western Australia. The Plan will help to establish Western Australia as a global hub for science and technology development and deployment, define pathways to capitalise on the State's unique advantages, and attract investment and talent to maximise impact.

A strong science and technology capability is key to realising the State's goals for economic development, community wellbeing and environmental stewardship. Ongoing advancements in science, and the adoption of new technologies, will be key tools to help address the challenges our State currently faces such as diversifying the economy, climate change, an ageing population, and geopolitical uncertainty. To successfully navigate these challenges, the State's science and technology capability will need to be underpinned by world-class, fit-for-purpose research and digital infrastructure, a skilled workforce, and robust systems, institutions, and legal frameworks.

1.1. Proposed Structure of The Plan

The proposed plan will provide a state-wide strategic roadmap for the next 10 years, outlining a fresh and ambitious vision for the State as well as defining key priority action areas (see the Terms of Reference at Attachment 1). An Action Plan that will include specific and tangible actions will form part of The Plan.

The Plan will help to prioritise Government efforts to identify key areas for action. At this time, it is expected that The Plan will articulate the following:

- a science and technology vision for the State;
- an assessment of the top challenges and opportunities faced by the State, now and into the future, that science and technology can address;
- a showcase of the State's current competitive advantages, as well as leading projects and infrastructure; and
- a list of cross-sector priority areas, as well as proposed actions to improve the State's science and technology capability, performance, and impact.

It is envisaged that The Plan will cover all elements of the science and technology ecosystem – public and private - including education, skills, infrastructure, funding models and partnerships, institutional arrangements, commercialisation opportunities, policy, and legislative frameworks.

The ongoing contribution of First Nations peoples to scientific discovery and advances will be central to the Plan, facilitating greater support for future engagement and endeavours.

2. Consultation Strategy: Phase One

A four-phase consultation plan is currently being deployed to support the development of The Plan. Each phase of consultation provides a forum for discussion and input to assist with the development of The Plan, by bringing stakeholders together to share information, identify opportunities, and foster a coordinated, strategic, and collaborative approach to policy development.

Broad consultation with stakeholders, including industry, research institutions, Aboriginal people, government agencies and universities commenced in September 2023.Throughout Phase One, the project team consulted with an estimated 500 individual stakeholders.

Key stakeholders fell into the following categories:

Stakeholder Category	Percentage of Total Engagement
Government	24%
Universities and Research Institutes	30%
Industry	38%
Other *(i.e., scientists, fellows, community)*	8%*

**Further targeted consultation sessions will be conducted in early 2024.*

Phase One consultations had three primary focal points:

1. Gain an understanding of the current science, research, and technology environment in Western Australia, including an assessment of strengths, weaknesses, opportunities, and threats.
2. Engage with a diverse range of stakeholders to brainstorm a high-level vision for science and technology and define key priorities and challenges for Western Australia.
3. Consider which challenges are most critical and should be prioritised. Investigate how resources can be best allocated to leverage Western Australia's competitive advantages, build and enhance key science and technology capabilities.

2.1. Consultation Methods

Phase One included a series of creative workshops with break-out brainstorming sessions, and one-on-one stakeholder meetings. A large workshop was held in Perth on 26 September 2023, allowing for attendance from a broad range of stakeholders across the Perth metropolitan area. Additional workshops were also held across all Western Australia's regions in consultation with the Regional Development Commissions.

Group workshop consultations consisted of brief presentations from key stakeholders on the current status of science and technology in their respective fields, including future impediments and opportunities. This was followed by an interactive workshop session to analyse the current science and technology ecosystem in Western Australia. Stakeholders collaborated to complete a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis, and brainstormed vision statements and priority areas.

One-on-one consultations began with stakeholders who had previously engaged with JTSI, followed by referrals and stakeholders who requested meetings after hearing about The Plan through their respective networks. These consultations concentrated on gaining more specific information to industry sectors, and clarifying issues raised in the workshops.

A thematic analysis of this data identified six overarching themes in the SWOT analysis: funding and investment; talent, skills and workforce; physical and digital infrastructure; policy and regulation; collaboration and engagement; and research impact, translation and commercialisation.

3. State Vision and Priorities

3.1. Vision

Input regarding a 10-year vision for The Plan described placing Western Australia at the forefront of science and technology nationally and globally. Stakeholders pictured a 10-year vision wherein Western Australia has: a bold, inquisitive, and innovative workforce; cutting-edge technology in world-class industries; and innovative solutions to support healthy, sustainable and resilient communities. Throughout consultations, stakeholders also emphasised that a 10-year vision should recognise the transformational intergenerational economic and social impact of greater science and technology capability in Western Australia.

Phase One consultations revealed 10 themes to base The Plan's 10-year vision upon:

- Sustainability
- Curiosity and Innovation
- Legacy and Stewardship
- Transformation
- Impact
- Destination
- Empowerment
- Climate Resilience
- World-leading
- Thriving people and communities

Examples of vision statements from the workshop include:

> *"A global hub of empowered and engaged people recognised and rewarded for world class research, commercialisation and impact for a better, more sustainable future."*
>
> *"Science and Technology developed to achieve environmental sustainability of industry and an equitable society across location and culture."*
>
> *"WA is a place where the community comes together to leverage knowledge to build and grow a sustainable future and strengthen resilience of future generations."*
>
> *"To live in a technological world, founded on creativity and knowledge, that reduces barriers to access allowing for diverse participation and global collaboration which drives an innovative environment."*
>
> *"To utilise science, technology and research to progress and develop our State for the betterment of all people, all industries and all regions."*

3.2. Science and Technology Priority Areas

Phase One consultations revealed preliminary preference areas with a strong emphasis on sustainability and climate resilience; deep technology (robotics, artificial intelligence, data management, sensors and automation, cybersecurity); science, technology, engineering, and mathematics (STEM); and biodiversity protection.

In the consultation workshops, stakeholder groups were asked to identify their top two priority industry and research areas within the science and technology sector. These are preliminary rankings and will be updated and validated in the next consultation phases.

Industry and Research Areas	Preference Votes
Clean Energy	26
Deep Technology	16
STEM	10
Natural Resources, Conservation and Biodiversity	10
Health, Medicine, Wellbeing and Omics	8
Global Research Innovation Industry Hub	7
Social and Community Development	6
Agriculture, Food Security and Nutrition	5
Tourism, Community and Indigenous Engagement	5
Sustainable Utilities Management	5
Aboriginal Science	4
Mining	2
Advanced Mineral and Material Refinement	2
Advanced Manufacturing	1
Space Technology	1
Regional Science	1
Defence	1

Metropolitan

For metropolitan stakeholders, industry and research areas of priority centred around establishing clean energy solutions (23% of metropolitan stakeholders) and advancing deep technology (21% of metropolitan stakeholders).

Other priorities that multiple stakeholders identified included Health, Medicine, Wellbeing and Omics (11% of metropolitan stakeholders), and Global Research Innovation Industry Hubs (11% of metropolitan stakeholders).

Regional

Regional stakeholders also noted the clean energy sector as a high priority for the State (25% of regional stakeholders). Social and community development, STEM, and natural resources, conservation and biodiversity were also equally recognised as priorities for regional communities (11% of regional stakeholders).

Additional proposed priorities for the State included: tourism, community, and Indigenous engagement (9% of regional stakeholders); sustainable utilities management (9% of regional stakeholders); and deep technology (8% of regional stakeholders).

4. Themed Consultation Feedback

4.1. Funding and Investment

Strengths

Western Australia is an attractive destination for foreign and domestic investment.

> Western Australia has a strong, stable government with a fair and effective governance environment. The Western Australian Government employs a rigorous budget management framework. In recent years, fiscal discipline and robust income from mining royalties has resulted in strong budget surpluses and a reduction in the State's net debt.

Industries and institutions receiving direct and stable funding are often leaders in their respective research areas.

> Institutions that were highlighted in the consultation included, the Western Australian Marine Science Institution, the Western Australian Biodiversity Science Institute, and the Harry Perkins Institute of Medical Research. Industry-led research leveraging Western Australia's world-class energy, mining, hydrogen, and defence capabilities was also considered a strength.
>
> The Western Australian Government's Future Health Research and Innovation Fund was highlighted as a good (but limited) example of public funding which stimulates

innovative science and technology solutions to critical issues faced by the Western Australian community.

Research and Development Corporations, such as the Grains Research and Development Corporation, are noted as a good model for funding and translating research. These corporations collect levies from the sale of produce such as grain and reinvest this int research to improve the industry. This means research priorities are driven by industry priorities and often have a clear adoption pathway.

Weaknesses

Poor and inequitable allocation and availability of research funding.

Current funding models and processes for research and development were consistently raised as a core weakness and hinderance in the State's science and technology sector. Several challenges were identified in current grant funding:

- Grants are complex and require significant time and resource investments, both to apply and to administer. There is insufficient grant application support, and the grant systems are disjointed with significant coverage gaps which limits the research capacity of the State's most skilled scientists and fellows.
- Grants often fund the core costs of a project with the institution required to cover the indirect overhead costs, these costs are substantial and can be prohibitive. It is difficult to coordinate co-funding arrangements.
- There are insufficient grants available, and the financial contribution and timing of grants is insufficient to fund long-term or exploratory research. As a country, investment in research funding has been decreasing – this does not present an attractive image for international researchers.
- Funding timelines are restricting and not flexible to the conditions of different industry sectors (i.e., seasonal and climatic delays that impact agricultural research).
- Relying on grant funding reduces the security of employment in the science and technology and research and development sectors. This includes government grants which fluctuate between election cycles. It also means a disproportionate amount of a researcher's time is spent writing grants rather than conducting research.
- A lack of long-term planning and collective vision has hampered the development of new and emerging science and technology. Grants are reactive rather than proactive, and philanthropic funding is risk averse without a clear endorsed direction from government.
- Western Australia is not competitive when applying for national non-government and Australian Government grants.

Investment in STEM education.

Stakeholders called for additional funding in STEM across all levels of education. The requirement for updated STEM curriculums and additional investment in STEM equipment and staff was strongly highlighted.

The cost of STEM education was noted as a prohibitive factor for higher education students, particularly for Aboriginal students and students in or from regional and rural areas.

Funding to maintain the standard of living and social welfare of the State's researchers and innovators.

University and government funding and salaries is not competing with compensation packages offered by private industries. As a result, it was reported that talent and resources are being pooled in the private sector – and in specific industries such as mining and energy – which is preventing the diversification and holistic development of the State's science and technology capabilities.

Cost of living and a lack of community infrastructure is a major barrier to attracting and retaining skilled researchers to the regions (as well as a lack of investment in regional research and technology infrastructure).

Opportunities

Incentives for collaboration.

The current ecosystem of grant funding models is creating excessive competition. There is an opportunity to incentivise collaboration between subject matter experts, universities, and industry to create a strong innovative culture in Western Australia.

Allocation of State resources and the budget surplus.

There is significant desire from all stakeholders for the State government to invest in key priority areas at scale. The existing levels of funding available to the science and technology sector in Western Australia are not competitive nationally or internationally. Large, targeted investment will allow Western Australia to grow our capabilities and become a destination for key research areas and international talent. There is an opportunity to increase the state government's contribution to the sector through secure long-term funding, topped-up by the current budget surplus.

The mining and energy sectors have significant resources which could be invested in research and technology development. There is an opportunity for government to fill in gaps by supporting new and emerging industries as they try to compete for talent and funding.

Regional capacity and capability building.

There is an opportunity to apply science and technology to solve critical economic and social challenges in regional and rural areas. Building upon remote capabilities to

deliver security in energy, food, water, digital connectivity, health, and education should be a priority.

Threats

Government funding cycle instability and inconsistency.

Current levels of state and federal funding are not sufficient. Historically, election cycles and/or changes in government have been critically disruptive to the State's science and technology sectors. A lack of bipartisan agreement on a science and technology vision for the state is preventing a long-term commitment to STEM funding, and broader funding to research and innovation. At present, there is also limited coordination between state and federal government funding.

Inequitable funding distribution.

There is inequitable distribution of national non-government and Australian Government funding. Western Australia is not competitive in funding bids against large, prestigious universities in the eastern states. Some stakeholders noted that funding is absorbed by high-profile areas or 'trending' industries as set by the media, as opposed to being allocated on a merit or priority basis.

A lack of support for mid-career researchers means that many senior Western Australian researchers who have previously been competitive in securing Australian Government funding are nearing retirement. The talent pipeline of researchers to succeed these experienced professionals is underdeveloped which will further impact the ability of the State to secure Commonwealth grants.

Regional stakeholders emphasised the inequitable distribution of funding between the State's metropolitan and regional centres.

Inadequate funding and investment in sustainability

Currently, there is inadequate funding in the science and technology sectors to reach the proposed public and international sustainability goals and targets.

Challenges and barriers to sourcing funding.

University funding models are increasingly reliant on income from international students' fees. As a result, university priorities and resources are shifting from research to international student attraction and attainment. Tighter university budgets are also restricting the ability of universities to (co-)invest in research projects, limiting the breadth and depth of research output.

4.2. Talent, Skills and Workforce

Strengths

Western Australia is an attractive location to live and work.

Western Australia has a high standard of living, with an ideal climate and diverse population. It is easy to advertise the State's lifestyle to international researchers, scientists, and innovators.

Western Australia has world-class facilities and a talented workforce.

Stakeholders identified that Western Australia has world-class facilities (for some industries) to support science and technology, such as SciTech, the Australian National Phenome Centre, a World Top 100 University and the Pawsey Supercomputing Research Centre. People in Western Australia are innovative by nature.

Western Australia has an innovative agriculture sector.

Farmers are smart, resilient, adaptive, and willing to take on a reasonable level of risk to support science and technology advances. The agricultural sector is a leading example of collaboration across the Western Australian Government, universities, research institutes and industry.

Western Australia is a hub for talent researchers in the agricultural sector and has opportunities for employment across the private and public sectors, and throughout the State's regions. The Department of Primary Industries and Regional Development is a key source of public sector employment for research scientists, supported by 'specified calling' position classifications and criteria-based career progression.

Western Australia has an innovative and highly skilled mining sector.

Western Australia attracts talent to the mining sector, including key talent in engineering and geoscience.

Weaknesses

Attracting and retaining talent.

Whilst the State's lifestyle is one of its greatest selling points, the current state of the housing market, general costs of living and perceived lack of opportunity present major barriers to attracting skilled international staff. Despite the demand for talent, there are not enough job opportunities – with guaranteed long-term funding - to offer job security to potential migrants. International qualifications present additional barriers to employment when are they are not recognised in Australia, or they are costly to transfer.

Stakeholders noted that there are considerable barriers to recruiting and retaining talented researchers in State Government departments including: bureaucratic

recruitment hurdles, difficulties re-evaluating specialised positions to reflect career development, uncompetitive compensation, and increasingly outdated state research infrastructure.

Throughout the consultation, it was repeatedly emphasised that Western Australia does not advertise itself well, both domestically and internationally, in the science and technology sectors. This includes failing to retain high school leavers in the regions who often choose interstate universities for study.

Professional development opportunities.

Due to the State's isolation, researchers often need to travel to attend conferences and events which support their professional development, as well as the communication and translation of new ideas in the science and technology sectors. Grant and public funding often do not account for these costs, and Western Australian researchers are often excluded from these events. Western Australia rarely hosts national and international science and technology events. This is exacerbated further for researchers working in the public sector with prohibitive travel policies.

There is a lack of succession planning in science and technology sectors which is contributing to a loss of corporate knowledge. It was reported that there are difficulties in convincing leading junior practitioners (particularly medical specialists) to engage in research due to a lack of senior mentorship, and differences in renumeration.

STEM education and developing a worker pipeline.

Stakeholders suggested that STEM promotion needs to start earlier in the primary school curriculum and at greater depth, especially for girls.

There are a limited range of local university courses causing domestic students to travel elsewhere early in their careers. The State's universities have similar business strategies and provide higher education across most subject areas. This is different to other countries which have specialised STEM universities. TAFE courses, particularly in regional areas, are reported as being outdated and not aligning with current job requirements, as well as not always being accessible.

It was reported that Western Australia's science and technology sectors have a 'who-you-know' culture which impacts up and coming researchers, particularly those from diverse population groups. There is a need to attract, train and retain more women and Aboriginal students to STEM high education courses and teaching positions. According to the Australian Academy of Science, in Australia, only 16% of Australia's STEM-skilled workforce are women.

Opportunities

Diversity and inclusion in STEM education and the STEM workforce.

There is an opportunity to improve the engagement, experiences, and opportunities available to diverse population groups in science and technology. Broader population

inclusion and participation in STEM will help address skilled labour shortages, and lead to more diverse research outputs.

International worker attraction.

The current structure of Australia's migration system does not support the science and technology sector. Complex requirements – for both the employer and the employee – create unclear pathways to migration, visa processing backlogs and high costs. This is making Australia uncompetitive in the demand for international talent.

Stakeholders also expressed concerns that the availability of visas is an impediment to retaining talent already in the country. International students studying Master and PhD qualifications do not have easy access to visa and career pathways to remain in Australia.

International visibility and workforce attraction.

Western Australia requires a clear branding for science and technology that can be consistently communicated by all stakeholders.

The science and technology sector would benefit from international research fellowships and industry secondments to improve visibility of the State and create and strengthen connections with international stakeholders.

Threats

Socioeconomic factors (housing, childcare, regional disparity, diversity, and inclusion).

The current cost of living crisis is making Western Australia less competitive to attract and retain talent. Workers will move where their partners and families can find jobs, which can be a struggle, particularly if they need to transfer international qualifications, or are trying to move to regional locations.

Aboriginal students do not have sufficient resources and support mechanisms throughout all level of education. There is a general lack of workforce diversity in science and technology industries.

Low uptake of STEM study in the next generation of workers.

The proportion of students completing Australian Tertiary Admission Rank studies in high school is decreasing, which is ultimately resulting in lower university enrolment rates. Today's students want jobs that 'make a difference' which could be achieved in the science and technology sector, but this is not communicated effectively.

Other industries are providing more lucrative salaries and benefits to attract and retain talent. This is filtering through to the study choices students are making both in high school and university. Students also have different values and expectations regarding work-life balance, and there is a perception that this is not currently reflected in some science and technology sectors.

It has been difficult to attract people to STEM teaching roles, particularly in regional locations, which is hampering efforts to increase student engagement with the sector.

Lacking clear career pathways.

There is a lack of well-defined career pathways in the science and technology sectors, and local success stories are not well communicated. The opportunities for employment in Western Australia are not advertised well to students, and the State's top talent is often lost to the east coast, or to international hubs.

Structure, stability, and competitiveness of renumeration packages.

Western Australia is losing researchers to industry jobs (particularly consulting) which have greater job security and additional benefits. The lacklustre job market for the science and technology sectors, particularly in research, is a barrier to attracting more students to STEM. Universities are particularly hindered by the inability to offer long-term and stable career prospects to researchers.

4.3. Physical and Digital Infrastructure

Strengths

Western Australia's geography and isolation.

Western Australia's unique geography has made it a hub for clean and renewable energy technologies, with plentiful access to sun, wind, waves, and critical minerals. The State's isolation also provides the ideal environmental conditions for space operation and explorations, as well as biodiversity and conservation research.

Interoperability of technology across the resources sector.

Western Australia leads the world in its capacity to identify, develop and extract deposits of a diverse range of minerals. It is home to the world's largest fleet of automated mining trucks, is at the forefront of remote-control technologies, real time integrations and 3D mine design. The State's world-class capabilities in the mining, oil and gas industries are increasingly being leveraged and adopted in new and often unrelated sectors (such as the provision of remote medical care).

Leading physical and digital infrastructure (in metropolitan centres).

Western Australia has some world-class physical infrastructure including the Pawsey Supercomputing Centre, Australian National Phenome Centre, the Harry Perkins Institute of Medical Research.

Western Australia has some of the best digital analytics infrastructure and capabilities in the country. It has growing potential in artificial intelligence data analytics and is home to the largest cyber security learning centre in the southern hemisphere. Note that this capacity and capability is not reflected regionally.

Weaknesses

Vulnerability of the State's physical and digital infrastructure.

Stakeholders highlighted that some of the State's key science and technology infrastructure is vulnerable to natural disasters (particularly in the regions) and cyber or physical attacks. The State's science and technology sectors also lack resilience due to lacking and/or ageing infrastructure. Regional infrastructure is ageing and often not fit for purpose.

It was also reported that the sector does not have enough local skilled technicians to service the current stock of infrastructure – future investments in physical and digital infrastructure needs to be matched with expertise to run and service the resources.

Regional gaps in both digital and socioeconomic infrastructure.

Compared to their metropolitan counterparts, there a no/few regional research hubs which reduces the ability of regional stakeholders to influence decision-making regarding research priorities. Similarly, the State's universities do not have a significant regional presence.

Poor digital connectivity in the State's regions is an inhibiting factor to the development of science and technology, and the conduct of research, in the regions. For example, developing remote operation capabilities in agriculture has been hinder by limited Wi-Fi and mobile connectivity across paddocks.

Inadequate socioeconomic infrastructure is a major barrier to attracting and retaining a talented workforce to the State's regions: housing shortages, poor healthcare infrastructure, expensive childcare, and limited education opportunities.

Funding for physical and digital infrastructure.

There are considerable sunk costs involved in establishing new research facilities and institutions. The real costs of infrastructure are not currently being met, and grant research funding doesn't cover core infrastructure requirements. The costs of accessing lab equipment are a barrier for many researchers.

Availability and access to common use infrastructure and equipment.

There is strong demand from the State's researchers for a greater pool of common use infrastructure. This includes infrastructure for biobanking, big data, clinical trials, and manufacturing. There was feedback from some stakeholders that is difficult to get equal access to shared infrastructure, particularly if tight timeframes apply.

Within health research there is often competition between clinical care and research for the use of clinical equipment. With clinical care requiring prioritisation research timelines can be substantially impacted.

Opportunities

Building the State's regional STEM capabilities.

There is an opportunity to make important infrastructure investments in the State's regions for community-wide benefits. For example, investing in communications connectivity will improve standards of living to attract potential science and technology workers, but it will also allow the operation of remote health and wellbeing services.

Investing in refreshing regional research infrastructure has the opportunity for significant flow on community benefits as well through the attraction of more people and funding to the regions.

The State Government has notable research capacity throughout the regions - particularly in the agriculture, food, and fisheries sectors – but supporting infrastructure has become outdated and inadequate for emerging research priorities.

Investment in data linkage capabilities and capacity.

Western Australia has strengths in data linkage for the medical and health sectors. Continued investment in data linkage systems (such as PeopleWA) makes research less costly and improves the economic and welfare outcomes for the State. There are opportunities to better advertise these capabilities domestically and internationally and extend data collaborations to feed into the systems.

Biodiversity and conservation research.

Western Australia has some of the richest biodiversity in the world. There is an opportunity to capitalise upon the State's unique ecosystems to lead the country's demand for biodiversity and biosecurity research and data.

Precincts and knowledge sharing.

Stakeholders acknowledged that there are inherent benefits to increasing the proximity of science, technology, and research institutions – particularly where investment in common-use infrastructure is required. It was also noted that where precincts have already been created, or are in the process of being developed, more work is required to make sure that sites are 'activated' and a mechanism to incentivise collaboration is introduced. If enterprises and institutions in hubs do not interact, they lose the benefit of being co-located.

Threats

Lack of system resilience.

The public sector's digital and information technology infrastructure is antiquated and is not integrated to achieve greater productivity. This impacts the ability of industry and universities to integrate with the public sector as well as hampering research within the public sector. Some infrastructure in universities and industry is outdated and not seen

as 'future ready'. The State's ageing science and technology infrastructure is a big impediment to competing globally for skilled researchers.

There is a lack of manufacturing and fabricating infrastructure in Western Australia and as a result, much of the State's science and technology infrastructure is imported. Western Australia is isolated from global supply chains which makes it more difficult and costly to source complex, specialist science and technology equipment from overseas.

Digital connectivity gaps.

There is a large digital divide between metropolitan centres, regional towns, and remote Aboriginal communities. Groups without access to digital infrastructure, or the digital literacy to benefit from it, are increasingly disengaged from society and the State's economy.

Sectoral disparity in infrastructure quality.

Throughout the Phase One consultation process, feedback regarding the current condition of the State's science and technology infrastructure was divided between sectors (based on both funding source and interest area).

The mining and resources sectors were broadly considered to be world-class, and stakeholders called for the State to be overtly proud of its capabilities. In contrast, university and government stakeholders noted that there is currently no direct line of funding dedicated to sustaining science and technology infrastructure and as a result, the State's infrastructure is increasingly outdated, run-down, and ill-suited to current capacity and research requirements.

4.4. Policy and Regulation

Strengths

Stability in State Government and policy.

The stability of Western Australia's State Government, and the relatively low complexity of its regulations, make it an attractive destination for foreign investment. There is strong public trust in the regulatory environment and clear strategies to bring industry ecosystems together. The Plan will provide structure and support to the science and technology sectors specifically by communicating the State's future development pathway and priorities.

Protecting Western Australia's environment.

Western Australia has strong biosecurity policies and regulations which are highly effective in managing pests and diseases. The State also has a successful blue economy, with well managed fisheries and ocean resources.

Weaknesses

Lack of vision to guide the State's research priorities.

Western Australia is currently lacking an all-encompassing long-term plan for the development of the science and technology sectors. This has prevented the State from specialising in areas of comparative advantage, and left researchers without strategic direction. There are several government plans and strategies within the science and technology space, primarily organised by sector, and The Plan will need to set a clear overarching structure ensuring alignment and coordination across all stakeholders.

No policies promoting Western Australian capabilities.

There is a prominent gap in the State's branding for science and technology. The State Government needs to introduce approaches to promote Western Australia's capabilities within the state and to the rest of Australia and improve the competitiveness and visibility of local researchers. There is also a lack of Western Australian representation on national decision-making bodies (including funding panels).

Some stakeholders raised concerns that the Western Australian Government doesn't procure science, technology, and research services locally, which has previously given more credibility to foreign innovation capabilities.

Regulatory barriers to research and commercialisation.

A number of regulatory requirements and processes were highlighted as impediments to the research and commercialisation process including bureaucratic funding obligations, intellectual property laws, ethics and governance processes, workplace health and safety requirements, clinical trial approval processes and animal ethics committees.

The State's regulatory environment is highly risk averse and is known to be difficult to navigate for entrepreneurial and commercialisation activities.

Ethics committees (health, education, justice) are a major impediment to the advancement of research in Western Australia. Current approval timeframes are incompatible with any plans to expand research capacity in the State's science and technology sectors.

Clarification of intellectual property laws.

The consultation revealed a generalised frustration and lack of understanding of the State's intellectual property laws and policies. This is particularly hampering the development of start-ups and fundamentally unique research. Stakeholders were unclear on what is covered by the current laws, and frequently requested clarification and support for the application of intellectual property laws in the science and technology sectors.

Stakeholders highlighted that there is additional complexity when the public sector contracts or collaborates with the private sector.

Opportunities

Prioritise local research and innovation.

New policies should be introduced to prioritise investment in, and procurement from, local Western Australian or Australian technology and research.

Increase industry investment in research and collaboration between sectors.

There is an opportunity to mandate and/or incentivise industry to invest more broadly in the science and technology sectors. Further policies could also be introduced to support cross-sector communication and collaboration so that funding is directed into research which will have the most beneficial outcome for the State.

Become the location of choice for research development, translation, and testing.

Western Australia should develop, adopt, and promote standards, governance and codes which are specifically designed to catalyse new science and technology innovations. The State could become a regulatory sandbox.

Threats

Global competition and geopolitical impacts.

Western Australia is increasingly required to compete against the benefits offered under the Inflation Reduction Act in the United States of America (USA). The Inflation Reduction Act has made the USA a favourable destination for foreign investment and skilled worker attraction which is increasingly diverting and extracting investment from Western Australia. To make the State's science and technology sectors globally recognised, areas of comparative advantage will need to be identified and policy incentives developed.

Inconsistent regulations across jurisdictions.

Stakeholders raised that there are some regulatory inconsistencies between states, and between state and federal requirements which can be difficult to navigate, particularly for small to medium size organisations. Specifically, concerns were identified for hydrogen industry, data, and climate change regulations.

Lack of regulatory agility to foster innovation.

The State's regulatory environment is not flexible enough to support the rapid change and evolution of the science and technology sectors.

4.5. Collaboration and Engagement

Strengths

Established pathways for engagement.

Collaboration and engagement between the State's universities and established research institutions (the Western Australian Marine Science Institution, The Western Australian Biodiversity Science Institute, the Pawsey Supercomputing Research Centre, the Harry Perkins Institute of Medical Research) functions relatively well.

Strong collaboration in the mining and agricultural sectors.

Strong collaboration in the mining and agricultural sectors due to a deep-set willingness to communicate with researchers, share industry insights and take on relative levels of risk to engage in innovative trials.

Community interest in science and technology.

Stakeholders highlighted that the Western Australian community is willing to engage with science and has strong interest in unique capabilities of the State. It was noted that despite strong community interest and engagement with the science and technology sectors, greater effort needs to be applied to science communication.

Weaknesses

Limited federal and international collaboration.

At present, Western Australia is poorly represented on national and international research, science, and technology bodies. There are fewer inter-state relationships between Western Australia's universities, research institutes and industry compared to those linking stakeholders based in the eastern states.

There is a role for the Western Australian Government to improve and support communication with other state and federal government departments to prevent the duplication of research.

Lack of incentives and resources to collaborate.

Incentives may be required to promote collaboration between researchers in the public sector, the private sector and universities who have a history of competition. Whilst some funding mandates collaboration, there are difficulties in negotiating agreements between companies and universities prior to and during funding arrangements.

In the public sector, there are travel and funding restrictions for government employees (researchers) which prevents the State's involvement in national and regional science and technology forums. This exacerbates Western Australia's isolation from other states, inhibits the development of key networks, and delays the distribution of new research and knowledge.

Absence of a Western Australian science brand.

Universities and research institutions in the eastern states are experienced at working collaboratively which helps make them more competitive when applying for philanthropic and federal government grants. Western Australia is not well represented in Canberra and on national science panels. A collective advocacy model is required to coordinate the State's engagements.

There is no centralised branding and promotion to communicate the State's science and technology capabilities to both Australian and international stakeholders. There is a prevailing narrative within the community that the State's technological expertise is limited to the mining and resources sectors. Greater science communication is needed for all stakeholders.

Opportunities

Foster a science ecosystem.

Stakeholders suggested that Western Australia needs to build a science and technology ecosystem with opportunities for engagement across all levels of society. The community would be actively engaged with and included in the State's science and technology sector. General science literacy would be improved and there would be well-promoted opportunities for the community to volunteer with the sector through areas such as science communication, clinical trials, and biosecurity surveillance.

Buy-in from the broader community would support: the State to attract national and international science and technology conferences; students to pursue careers in STEM; and research institutions to attract skilled talent.

Potential for international collaboration.

Western Australia's location provides unique opportunities for collaboration with key and fast-growing markets in Asia. Perth has a shared time zone with Asia and is increasingly the physical and digital gateway to the region. The State's geographic proximity is an important advantage when collaborating internationally for research and trade.

Recognition and expansion of Indigenous science.

Some stakeholders highlighted an opportunity to integrate Indigenous knowledge into the STEM curriculum and champion indigenous-driven science solutions. Stakeholders highlighted the success of the Aboriginal Ranger Program and suggested the continuation and expansion of the Program, with particular emphasis given to research and innovation.

Threats

Workforce shortages.

A shallow pool of skilled domestic workers, barriers to skilled migration, and intraregional and interstate loss of talent is a major risk for the State's science and technology sector.

Balancing competition and collaboration.

Given the acute shortage of funding and resources available to the State's researchers, a competitive culture has become embedded in the science and technology sectors. The State is at risk of being 'left behind' if stakeholders continue to compete in silos.

Misinformation and external perception.

Misinformation campaigns are increasingly degrading the public's trust in science and technology. Whilst scientific literacy rates remain low, it may be difficult to attain community buy-in for significant new investment in the sector.

4.6. Research Impact, Translation and Commercialisation

Strengths

World-class institutions.

Western Australia is home to world-class science and technology bodies including the Western Australian Marine Science Institution, Western Australian Biodiversity Science Institute, and Telethon Kids Institute.

High standard of research.

Stakeholders highlighted that Western Australia conducts nation-leading research in the areas of medicine, biodiversity restoration, water management and agriculture. In the health and medical research sector, the State has a high rate of drug discovery and approval from the Therapeutic Goods Administration.

Strong translation in agriculture.

There are strong processes in place to support the rapid uptake and translation of research in the agricultural sector in Western Australia. This is supported by strong linkages between farmers, local grower groups, research development cooperations and the Department of Primary Industries and Regional Development. This progresses the rapid uptake of new technologies, farming techniques and plant breeds.

Weaknesses

The translation and commercialisation process.

Stakeholders raised that there is a lack of university and State Government support for the commercialisation process. Some academics were concerned that the commercialisation process sat outside of their purview and additional roles and support mechanisms are needed to facilitate translation and commercialisation.

In the rapid pace of the global science and technology market, the State's current processes and procedures increase research timeframes such that the impact and commercialisation value of research is reduced. Uncertainty around the strength and applicability of intellectual property policies and laws in Western Australia can also delay or prevent the publication and commercialisation of research.

There is limited translation of research in some sectors, notably health. This results from a disconnect between research and clinical care in the health sector. It has also been noted that there is a lack of resources and adequately trained translation scientists across the research and university sector.

University commercialisation capacity.

Stakeholders emphasised that Western Australian universities have limited capacity to support commercialisation and start-up activities. The protection of intellectual property when collaborating with universities was identified as a barrier to commercialisation.

Within universities it has been noted that there is a lack of financial and human resources to support translation and commercialisation.

Competing occupational priorities.

There is a lack of incentives to commercialise academic research. Researchers are increasingly engaged in additional teaching, management and administration duties which limit their research capacity.

Research and development is often tied to short-term outcomes with rapid return on investment. As a result, the appetite for innovative and speculative research and development is restricted.

Measuring research impact.

There is a lack of standardised processes and requirements to support quantifying research impact. This means there are limited metrics on government investment in research and the impact of that investment.

Opportunities

Science communication and networking.

There is an opportunity to improve science communication both within and outside the science and technology sector. A centralised mechanism is required to promote the State's successful research outcomes and facilitate knowledge sharing throughout the sector.

The battery and critical minerals sector.

There is a large opportunity for research in the resources sector, particularly the battery and critical minerals industry. Western Australia has a large endowment of minerals which will be central to decarbonisation initiatives globally. Research and technology development which can support the business case for downstream processing and manufacturing of minerals locally will be essential to the State's economic development.

Learning from international counterparts.

Western Australia is playing 'catch-up' in the science and technology sector which provides the opportunity to observe and learn from international counterparts.

Threats

Deteriorating community trust in 'information'.

Whilst Australia has traditionally had strong levels of trust in scientists and research, rising levels of misinformation and media bias is fuelling public scepticism and distrust in science communication (particularly over social media channels). General science communication, both in quality and quantity, is a weakness of the science and technology sector in Western Australia. In our discussions it appeared that scepticism or lack of trust seemed more significant in the Perth metropolitan area compared with the regions, however this may have been influenced by the backgrounds and roles of the people we were engaging with and may not be reflective of the broader population.

Alignment of research priorities.

The lack of a State 'vision' for the science and technology sector has resulted in an uncoordinated approach to local research prioritisation. There is poor communication between researchers and end-users within the science and technology sector. It was reported that there is a lack of alignment between different stakeholders regarding research priorities and targeted outcomes. Greater engagement between researchers and industry is required to ensure that research priorities align with industry demand and applications.

Some stakeholders also noted an imbalance in the quantity of fundamental research versus applied research, and metrocentric versus regional research.

Market barriers to commercialisation.

Stakeholders reported that there are high barriers to market entry in Australia, particularly for researchers and organisations that are competing with established industries from other states and territories. The cost of translation and commercialisation activities was another reported barrier, with more cost-effective alternative available overseas.

Poor culture of translation and commercialisation.

Western Australia's science and technology sector does not have a commercialisation culture, and translation is not always the primary driver of research. Multiple stakeholders raised the protection of intellectual property as a particular friction point within the commercialisation environment.

5. Next Steps

The next steps in the consultation process are outlined below. Please note that these are indicative plans and subject to change.

a) *Phase Two (from December 2023)*
- The aim of Phase Two will be to verify the findings from Phase One, as outlined in this report. An online survey and a portal for public submissions will be made available to stakeholders and the public.

b) Targeted Consultations (from January 2024)
- Targeted consultation sessions and site visits will be held with underrepresented stakeholder groups.

c) *Phase Three*
- The aim of Phase Three will be to confirm the vision and priorities of The Plan and identify potential actions for the Western Australian Government. It will include themed roundtables and one-on-one consultations.

d) Phase Four
- A draft of The Plan will be made available to provide feedback. This will be the final opportunity to comment on The Plan prior to publication.

For updates on The Plan and the progression of the consultation process, visit JTSI's website Science and innovation: science and technology plan (www.wa.gov.au).

For enquiries regarding The Plan, contact sciencetechplan@jtsi.wa.gov.au.

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