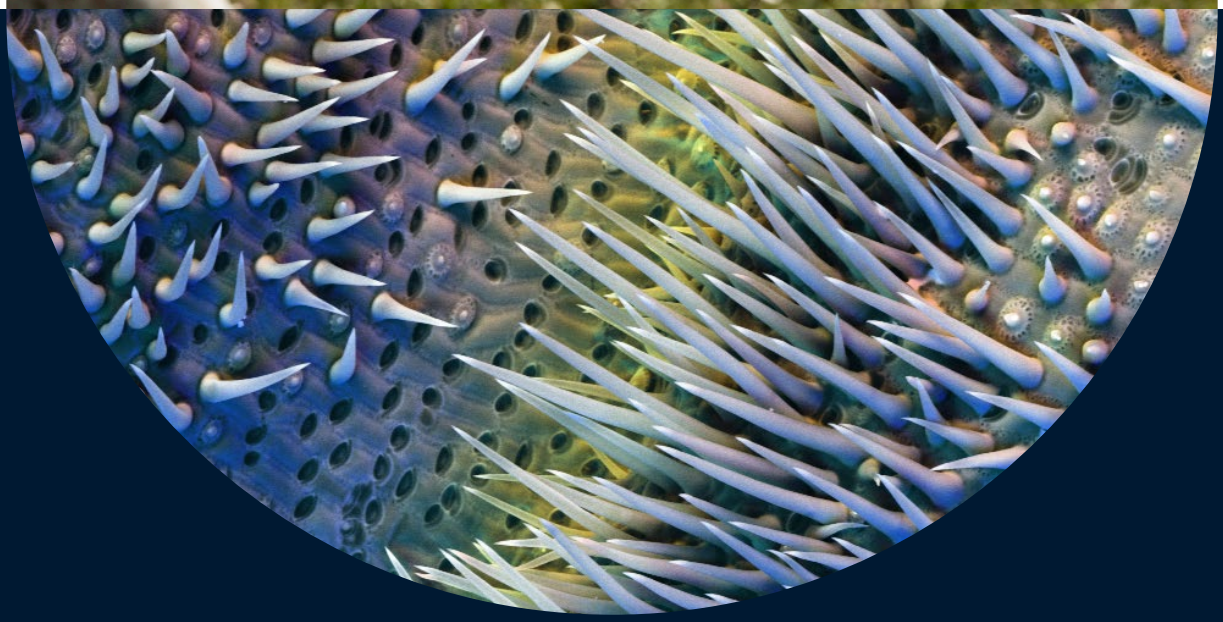
Australia's National Science Agency



Corporate Plan 2019–20

Infrared temperature sensors.

Digital technologies and big data are transforming our agricultural sector. These sensors monitor canopy temperature to help improve water efficiency in the cotton industry.

Electron microscope image of the surface of wheat.

Our scientists captured this stunning image while investigating the properties of wild and mutant wheat plants to assist in breeding varieties suited to Australian conditions.

Contents

Our extraordinary people bring our excellent science to life. They work with some of the most talented minds in and across their fields – not just at CSIRO, but in Australia and the world.

01

Introduction

1.1 Opening statement

On behalf of the CSIRO Board, I am pleased to present our key strategic planning document, the CSIRO Corporate Plan 2019–20.

As Australia's national science agency, CSIRO's purpose is to solve the greatest challenges through innovative science and technology. This Corporate Plan builds on previous plans to direct: how CSIRO will deliver on our purpose for the next four years (2019–20 to 2022–23); how our key priorities align with the legislation that CSIRO abides with; and how we will measure success.

We report back on our progress through our Annual Report, and it is the Board's role to ensure, at all times, CSIRO demonstrates accountability, transparency, and return on the investment made by the people of Australia.

Our Corporate Plan meets the requirements of s35 (1) (b) of the *Public Governance, Performance and Accountability Act 2013*, the CSIRO Statement of Expectations of November 2016 and the responding CSIRO Statement of Intent of May 2017.

Our Corporate Plan 2019–20 sets a clear course ahead for CSIRO to build on a century of national benefit through science and innovation as Australia, and the world continues to face many challenges from advancement of technology to the ageing of western societies.

I look forward to seeing this Corporate Plan continue to guide CSIRO's work to make life better for every Australian.

David Thodey AO
Chairman of the Board

July 2019

1.2 Chief Executive's foreword

This is our first Corporate Plan under our new rolling approach to strategy at Australia's national science agency.

Our rolling approach replaces our five-year strategy cycle with a more adaptive response to our most important customers – 24 million Australians. It ensures we can deliver on our purpose to solve the greatest challenges through innovative science and technology.

Two key themes from our new approach to strategy are reflected in this Corporate Plan: the six challenges and Domain + Digital. These are captured and represented in our new Challenges and Digital Transformation Program.

Challenges and Digital Transformation Program

Solving the greatest challenges has never been more important. The six challenges CSIRO is focused on are:

- food security and quality
- health and wellbeing
- resilient and valuable environments
- sustainable energy and resources
- future industries
- a secure Australia and region.

We won't solve these alone; we collaborate with every university, every area of government and across Australian industry to unlock a better future for everyone. Our Corporate Plan contextualises these challenges so our solutions from science focus on these priorities into the future.

To deliver on our challenges, we are embracing the opportunities of digital disruption. We will do this by integrating our deep domain expertise in traditional industries such as agriculture, manufacturing and health, with our cutting-edge digital technology to accelerate the pace and scale of our impact.

We will harness big data, artificial intelligence and machine learning to see new patterns and invent new solutions through initiatives such as our Managed Data Ecosystem and Decadal Science and Technology Plan. We're also creating opportunities for our people to build digital capability and add more human value through our Digital Academy.

I'm especially proud that our new approach to strategy has again evolved from the minds of 5,500 great CSIRO people focused on delivering the greatest national benefit.

This Corporate Plan ensures your national science agency continues to deliver on its purpose to solve the greatest challenges – the air we breathe, the land we grow, the water we drink, the food we eat and the life we live. When we all focus on the big things that really matter, Australian science and technology can solve seemingly impossible problems, and create new value for all Australians.

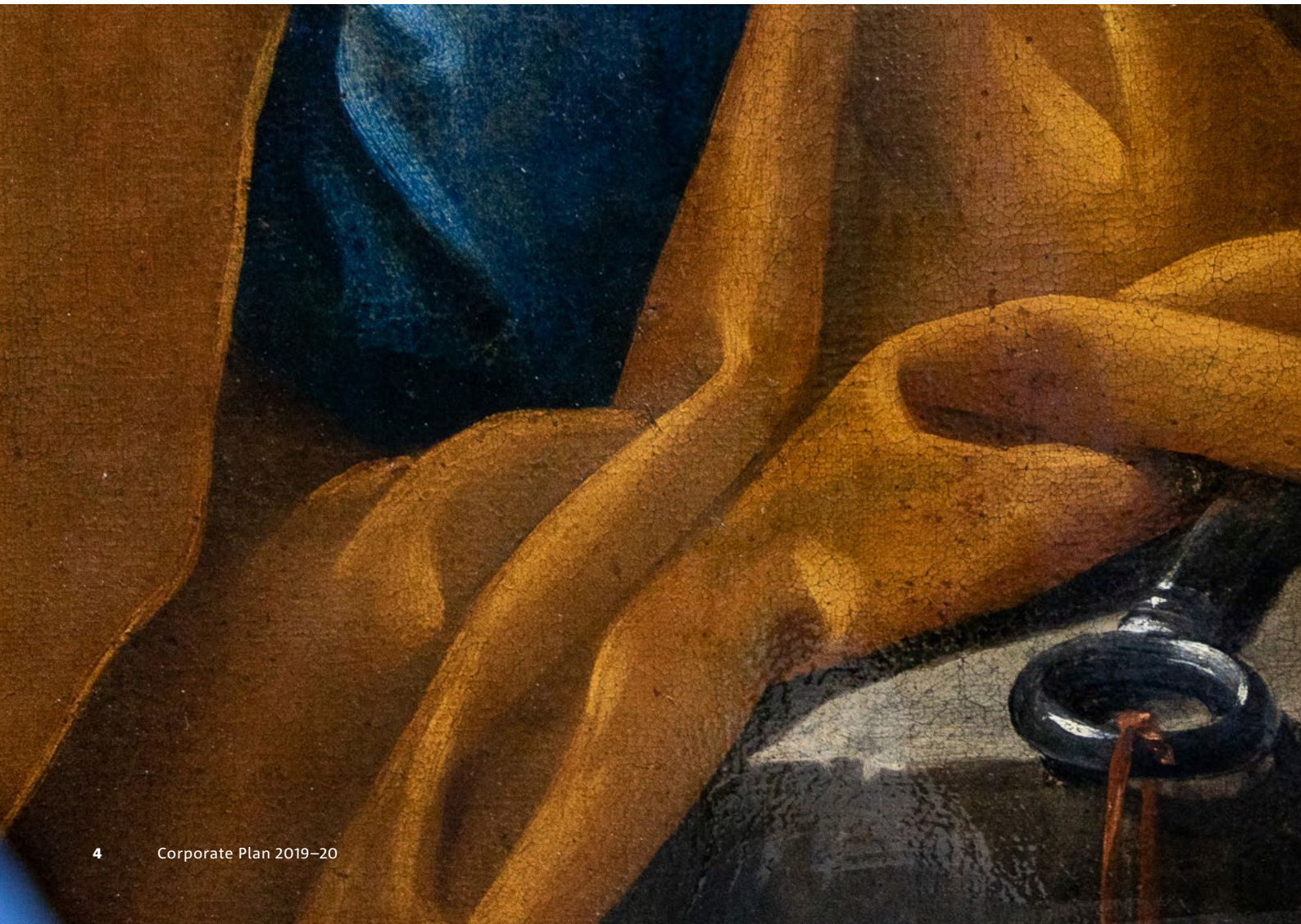
Dr Larry Marshall
Chief Executive

July 2019

Preserving priceless masterpieces for future generations.

Flow chemistry is the latest development in chemical processing. We collaborated with the National Gallery of Victoria and used flow chemistry to create a new varnish that will protect paintings from ageing. We're now working with Melbourne-based company, Boron Molecular, to manufacture it for conservation professionals – preserving masterpieces for the future.

Image courtesy of National Gallery of Victoria.



02

Our purpose and strategy

2.1 Strategy at a glance

Purpose

We solve the greatest challenges through innovative science and technology.

Objectives

Primary activities to deliver our purpose

1

Conduct and encourage the uptake of world-class scientific research.

2

Mobilise and develop the best talent, for the benefit of Australia.

Outcomes

Results of our work

Triple bottom line impact to Australia.

Lift Australia's science capacity and capability.

Strategic pillars

Six core areas that guide our operations

Customer first

Creating deep innovation relationships with our customers and prioritising the highest impact investments.

Thriving people and teams

Putting people and their safety first while supporting them to thrive and adapt in a changing world.

Values

During 2019, we are working to define a core set of values.

Vision

We are Australia's innovation catalyst, collaborating to boost Australia's innovation performance.

3

Manage national research infrastructure for the nation.

Accessible world-class facilities to underpin research and innovation.

4

Ensure the sustainability of CSIRO.

Sustainable operations, cultural health, safety and wellbeing.

Collaborative networks

Collaborating to integrate the best solutions for our customers, increasing our flexibility, and enhancing Australia's innovation performance.

Science excellence

Creating breakthrough technology and knowledge, being a trusted advisor for Australia.

Global engagement for national benefit

Delivering connectivity to the global science, technology and innovation frontier, as well as accessing new markets for Australian innovation.

Breakthrough innovation

Increasing our capacity to help reinvent existing industries and creating new industries for Australia and delivering public good.

2.2 Our purpose and strategy

Our purpose

We are an Australian Government statutory authority within the Industry, Innovation and Science portfolio, operating under the provisions of the *Science and Industry Research Act 1949* (SIR Act). To align with our Portfolio Budget Statement (PBS) outcome statement, we describe our purpose as:

Solving the greatest challenges through innovative science and technology.

As Australia's national science agency we play a distinct role as a large, multidisciplinary research organisation. We connect extensively across the wider research and innovation system, seek to be a preferred partner to industry and a trusted advisor to government. In doing so, we act as an innovation catalyst, enhancing Australia's capacity to turn more world-class research into benefits for the nation.

Our strategy

Our strategy directs how we will achieve our purpose, and comprises our objectives and outcomes. We are guided by the strategic pillars as the key areas for how we focus the delivery of our science to meet our purpose and vision.

Our vision

Recognising CSIRO's unique role in Australia, and the highly collaborative and innovative nature of what is needed to solve the greatest challenges, our vision is:

Australia's innovation catalyst, collaborating to boost Australia's innovation performance.

Objectives

For over 100 years, CSIRO has been the mission-led national science agency, collaborating across the innovation system. These primary objectives from our Corporate Plan help us to deliver on our purpose:

1. Conduct and encourage the uptake of world-class scientific research.
2. Mobilise and develop the best talent, for the benefit of Australia.
3. Manage national research infrastructure for the nation.
4. Ensure the sustainability of CSIRO.

Outcomes

These high-level outcomes show the results of our work.

1. Triple bottom line impact to Australia: delivering benefit for academia, government and industry through our research, science and technology.
2. Lift Australia's science capacity and capability: delivering STEM programs to help increase Australia's national scientific literacy and science capability.
3. Accessible, world-class facilities to underpin research and innovation: making sure our facilities are available for access by the research community and used effectively.
4. Cultural health, safety and wellbeing: ensuring our people work in safe, supportive environments.

Strategic pillars

Six core areas guide our operations and how we bring our purpose, vision and strategy to life:

- Customer first: creating deep innovation relationships with our customers and prioritising the highest impact investments.
- Thriving people and teams: putting people and their safety first, while supporting them to thrive and adapt in a changing world.
- Collaborative networks: integrating the best solutions for our customers, increasing our flexibility and enhancing Australia's innovation performance.
- Science excellence: creating breakthrough technology and knowledge, being a trusted advisor for Australia.
- Global engagement for national benefit: delivering connectivity to the global science, technology and innovation frontier, as well as accessing new markets for Australian innovation.
- Breakthrough innovation: increasing our capacity to help reinvent existing industries and creating new industries for Australia and delivering public good.

Values

This year we are working with staff to co-create our core set of values. These values will be the centre of our cultural vision – they will collectively describe what is unique about CSIRO and will help us deliver on our strategy.

2.3 Our rolling strategy approach

Our new approach to strategic planning is a rolling strategy model. Instead of dramatically shifting course every five years for a new strategy period, we will continuously assess and adjust our strategy. We will conduct more regular internal and external engagement and measurement to gauge the success of our current strategy and the need for iterative adjustments. This approach recognises that the world is changing at an unprecedented pace, and that we must respond in real time to seize the opportunities presented by disruption. Topics for exploration are identified and investigated, including internal and external feedback. Iterations are based on learnings from implementation and changes in our operating environment. Updates are captured in our annual Corporate Plan, as our key strategic planning document.

Challenges and Digital Transformation Program

Our first rolling strategy topic for investigation began with discussions on the disruption of the fourth industrial revolution and how we could accelerate the impact of our domain expertise through digital technologies. This led to engagement with our people and partners to explore opportunities and focus our efforts in exciting areas of science, new ways for using and managing large datasets, and building skills and talent.

Six challenges

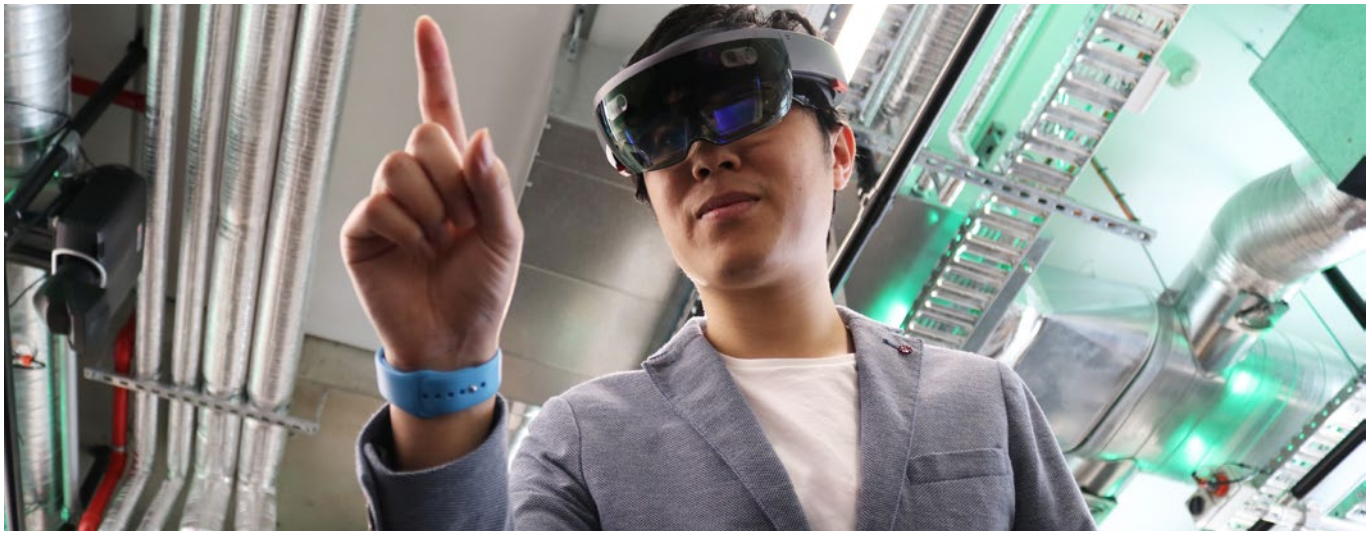
Our purpose is to solve the greatest challenges through innovative science and technology. Our second rolling strategy topic for investigation was to clarify these challenges. We drew on our work from national foresighting, industry roadmapping, stakeholder input and an assessment against the United Nation's Sustainable Development Goals.[1] We then characterised the greatest challenges in the Australian context. This is where CSIRO plays a unique role through our multidisciplinary science and working collaboratively to develop integrated solutions to complex national challenges.

The six challenges are:

- food security and quality
- health and wellbeing
- resilient and valuable environments
- sustainable energy and resources
- future industries
- a secure Australia and region.

Our multidisciplinary science, combined with our digital expertise, will amplify our ability to solve the six challenge areas, and we will achieve this through our Challenges and Digital Transformation Program.

We're harnessing the digital revolution. Our Digiscape Future Science Platform is building a common big data infrastructure that will support next generation decision-making and transform agricultural industries and environmental action.



Our science: informing future decisions in Northern Australia.

The Northern Australia Water Resource Assessment investigated the Fitzroy River catchment in Western Australia (pictured), the Finniss, Adelaide, Mary and Wildman river catchments in the Northern Territory, and the Mitchell River catchment in Queensland. We wanted to better understand the scale and nature of future development opportunities. Through field studies and desktop analyses, we investigated land suitability for irrigation and aquaculture, water storage and capture options, and the economic and ecological impacts of those developments.

03

Our operating environment

3.1 Global trends influencing our strategy

Strategic foresight reports developed with our staff, partners and customers, including *CSIRO Global Megatrends, Australian National Outlook 2019 and industry roadmaps*[2] will influence our decisions and the way we operate over the next four years, from 2019–20 to 2022–23.

We actively monitor and analyse key global trends that influence our operating environment.

THE TREND

Global connectedness

The world is more connected than ever before, and flows of trade, capital, information and people continue to deepen and broaden at an increasing rate.

The fourth industrial revolution

The next wave of digital innovation – referred as the fourth industrial revolution and characterised by a suite of platform technologies, such as Artificial Intelligence (AI) – is creating a connected virtual world. It is globally disrupting entire systems of production, management, and governance.

Rise of Asia

Rapid economic growth in Asia has shifted the world's economic centre of gravity east. Today, foreign direct investments flows to the Association of South East Asian Nations (ASEAN) are rising at a record level.[7] China is Australia's largest trading partner accounting for nearly one-third of Australia's exports.[8]

Health of an ageing world

A rapidly ageing world population, especially in developed countries such as Australia, is escalating healthcare expenditure, and changing people's lifestyles, the services they demand, and the structure and function of the labour market.

Balancing growth with sustainability

Rising global populations are depleting natural resources. Loss of biodiversity is drawing increased scrutiny across the globe. Climate change is a significant economic, environmental and social issue.

THE OPPORTUNITY	CSIRO'S RESPONSE
Currently, Australia is ranked 33rd overall and 24th in the Organisation for Economic Cooperation and Development (OECD) in the Global Connectedness Index 2018.[3] Global connectedness contributes to greater influence and economic growth. Australia will benefit from appropriate policy setting and business and innovation factors driving global connections.	Our strategic pillar Global engagement for national benefit and associated global strategy, focus areas and initiatives (see Function 1.2 on page 26) aim to strengthen relationships in key regions to return benefits to Australia. Our people based in the US, Singapore, Chile, Indonesia and France, act as hubs for their regions, promoting Australian innovation and strengthening the bridges between Australia and the world.
This digital science and technology wave is expected to create $10–15 trillion of global opportunity.[4] In Australia alone, digital technology is expected to contribute between $140 billion and $250 billion to the gross domestic product by 2025.[5] Compared to our OECD peers, Australia has captured a third less value from digital innovation[6], offering a significant opportunity to positively transform Australia's economy and society.	Our strategic focus on challenges and digital transformation (see Function 1.2 on page 26) under our rolling strategy approach responds to this trend by exploring the power of partnering our domain expertise with digital technologies, to accelerate the pace and scale of our science impact. Under this program, we are investing in platform technologies, such as AI, improved management of our data, digital upskilling of our people, and directing a greater effort to mission programs that solve the greatest challenges (see Function 1.1 on page 23).
China's Research and Development (R&D) investment ($445 billion in 2017) has surpassed the total R&D investments of the European Union and is expected to surpass that of the US by 2024.[9] India has been ranked as the top innovation destination in Asia.[9] As a regional neighbour, Australia is well-placed to benefit from this shift east.	Under our strategic pillar Global engagement for national benefit and Function 1.2 (see page 26), we are capitalising on our geographic proximity and our already strong ties to Asia through our ASEAN presence based in Singapore and Indonesia. By growing our network in the region, we're further connecting and collaborating with these emerging hotspots of knowledge generation, trade opportunities and global talent.
The global population aged 60 years or more is forecast to reach 22% of the total population by 2050, up from 12% in 2012.[10] There are growing opportunities for the innovation sector to advance medical sciences and connect and deliver services that will improve the health and wellbeing of the world and Australian population.	We are investing in two emerging fields of health research to unite domain expertise with platform technologies: digital health, and precision health and genomics (a CSIRO Future Science Platform). Digital health can connect older patients in their homes or remote locations with specialist medical care, while precision health and medicine is helping us understand personalised causes and treatments for illnesses.
Increased societal awareness is driving pressure to see economic growth while maintaining sustainable operations. Specifically, attention is focused on energy, water and food management, as well as a major transition to more effective circular economies to manage waste.	Our strategic focus with the Challenges and Digital Transformation Program recognises the inherent tension between many of our national issues, in particular trying to achieve a 'resilient and valuable environment' while also striving for 'sustainable energy and resources' and 'future industries', as examples. With bold, inspirational and collaborative mission programs, we will build on existing strengths and work with partners to deliver practical solutions to challenges such as these.

3.2 Australia's innovation trends influencing our strategy

A review of Australian innovation system reports including *Innovation and Science Australia 2017* and *Australian Innovation System Report 2017*, developed with our staff, partners and customers, has helped us identity key trends, challenges and opportunities for the innovation system. These have helped inform the role we seek to play in lifting our national innovation performance.

THE TREND

Australia's global innovation performance

Australia's innovation system has ranked two places lower from 2018 to 22nd of 129 economies in the Global Innovation Index 2019 rankings.[11] While its Innovation Output Index ranking remained unchanged from 2018 at 31st, it was the drop in the Innovation Input Index ranking from 11th in 2018 to 15th in 2019 that contributed to overall ranking decline.

Australia's R&D investment

Australia's gross expenditure on R&D (GERD) as a proportion of the GDP fell from 2.11% in 2013–14 to 1.88% in 2015–16.[13] This is well below the OECD average of 2.34% and the top five countries' average of 3.66%.[14]

In recent years, spending on R&D by government (GovERD) and business (BERD) as a proportion of the GDP has diminished, but higher education expenditure on R&D (HERD) has increased.[15]

While Australia still lags its OECD peers in terms of venture capital investment, activity has picked up in recent years.[16]

Australia's skill deficit

Science, Technology, Engineering and Mathematics (STEM) and digital skills will play a vital role in Australia's future growth.

Trust in institutions

Overall trust in governments, businesses, non-governmental organisations and the media has declined in recent years.[22]

THE OPPORTUNITY	CSIRO'S RESPONSE
To compete globally in the $1.6 trillion innovation race[12], Australia will have to undertake more new-to-world innovation compared to incremental innovation, and improve its collaboration, translational and commercialisation track records.	To solve the greatest challenges, our vision is to be Australia's innovation catalyst, collaborating to boost Australia's innovation performance. We do this by working with every university, government department and major industry, as well as strengthening Australia's translational and entrepreneurial skills through programs such as the CSIRO Innovation Fund, managed by Main Sequence Ventures (see also Function 1.3 on page 28).
Our share of the government's total R&D appropriation investment has been slowly declining from the peaks of about 30% in the early 1980s to about 8% in 2015.[17] However, in the last few years, the proportion of GovERD being funded by industry has risen from 7.7% in 2012 to 9.9% in 2014. A likely reason is the stronger links with industry that publicly funded research agencies such as CSIRO have developed. As a result, Australia now ranks ahead of countries such as the US in the proportion of GovERD funded by industry.[18]	Given this trend, our strategic pillars Global engagement for national benefit and Collaborative networks supports us engaging globally to tap into the global R&D investment and seeking greater partnership with the university, industry and venture capital sectors to sustain and grow our research and innovation activities. Key activities under Function 1.1 (see page 24) such as ASX100 and Small and Medium Enterprise (SME) engagement, will also focus on strategic engagement with industry. Our strategic focus on the Challenges and Digital Transformation Program recognises the need for collaboration to make R&D investment go further, through sharing limited resources rather than competing for them. The six challenges seek to unify efforts around large-scale programs and missions rather than disperse investment and activity.
In Australian schools, enrolments in STEM subjects are at the lowest levels in 20 years[19] and students' performance in STEM subjects is slipping.[20] Over the next 5–10 years, 50% of employers expect an increased demand for STEM trained professionals.[21]	We strengthen Australia's STEM talent pipeline through education and outreach programs in schools and communities (see Function 2.1 on page 31). We continue that support for universities through programs such as our Industry PhD (iPhD) and postdoctoral fellowships to encourage STEM professionals into industry and the broader innovation system. Within CSIRO, our Challenges and Digital Transformation Program is investing in a Digital Academy to improve our digital capability and attract world-class talent.
The level of trust people have in scientists in Australia and New Zealand is higher than world measures – 33% in Australia and New Zealand have high trust in their scientists compared to 18% globally.[23] This level of trust is key to our role in building consensus and developing long-term solutions that address national challenges.	One of our key strategic priorities is to ensure we are seen as a trusted advisor. We regularly review our strategy and investments against our purpose, measure and monitor benefits we deliver to Australia, and share tailored messages of our impact to our partners, community and government (see Function 1.1 on page 23).

3.3 Our planning environment and framework

We operate in a complex environment. Our Corporate Plan takes into account multiple inputs – from the legislation that created CSIRO, the various market and science priority areas which form the focus of our operations, to the ideas that come from institutions, our partners and the community that support us. All the influences and processes represented here help us decide what we work on in order to solve the greatest challenges.

The Minister and the Board draw upon the SIR Act, the Board Charter, and the Ministerial Statement of Expectation to outline the governance, function, and broader expectations related to our performance. These guide and inform the development of our Statement of Intent and our objectives and priorities for the following four years. Our operations are also governed by a range of other Australian Government and State and Territory legislation, including the *Environment Protection and Biodiversity Conservation Act 1999* and the *Freedom of Information Act 1982*.

Our overarching Business Unit strategies, including budgeting and risk planning, investment decisions and capability deployment processes, also take into account input from environmental factors, external stakeholders, and internal decisions over the allocation of resources.

Our financial sustainability strongly depends on the Australian and global research and development services markets, from both the private sector and public sector, and commercial factors including the intellectual property environment. Our operating budget is funded from appropriate revenue from government and our own source of revenue earned from industries, including Australian private sector, Australian governments (state, territory and federal), rural industry R&D corporations, Cooperative Research Centres, and overseas entities, as well as our intellectual property.

Transforming the cotton industry.

Our cotton research is improving the sustainability, productivity, fibre quality and distinctiveness of the Australian cotton crop. We're achieving this through the development of high-performing varieties, matching crop management strategies, improved post-harvest fibre processing technologies, and the development of value-added co-products.

3.4 Portfolio Budget Statements, Corporate Plan and Annual Report

Our Corporate Plan is our key strategic planning document. It is aligned to the Portfolio Budget Statement (PBS), which describes the outcomes, proposed allocation of resources, and our performance. The Corporate Plan outlines our objectives, functions, and investments required to deliver on our functions set by the SIR Act, and deliver on our purpose stated in the PBS.

Results of our performance against the planned activities and outcomes, stated in this Corporate Plan and the PBS, are provided in our Annual Report.

Portfolio Budget Statements

Budget appropriations are made against the outcomes and programs listed in the PBS

Corporate Plan

Our objectives and functions aligned to our Act over the next four years so we achieve our purpose

Annual Report

Our performance for the year against the PBS and Corporate Plan

* As our key planning document, the Corporate Plan includes the full set of KPIs endorsed by the Board. Generally, only the single most critical of these features in the PBS for each PBS program. However, for some programs e.g. National Facilities and Collections, the single KPI has a number of metrics which are recorded in more detail in our PBS.

Our purpose: solving the greatest challenges through innovative science and technology.

Program 1

Research: Science, Services and Innovation Fund

Program 3

Science and Industry Endowment Fund (SIEF)

Program 2

National research infrastructure: National Facilities and Collections

Objective 1

Conduct and encourage the uptake of world-class scientific research.

Function 1.1

Conduct and facilitate the uptake of excellent scientific and technology solutions to deliver impact to the nation.

Function 1.2

Connect to global science, technology and innovation to access new opportunities for Australian innovation.

Function 1.3

Manage funding directed to industrial scientific research activities, commercialisation of technologies and assistance to industry through research collaboration and capacity building.

Objective 2

Mobilise and develop the best talent, for the benefit of Australia.

Function 2.1

Promote Science, Technology, Engineering and Mathematics (STEM) capability, development and education.

Objective 3

Manage national research infrastructure for the nation.

Function 3.1

Ensure utilisation of national facilities and collections.

Objective 4

Ensure the sustainability of CSIRO.

Function 4.1

Ensure a vibrant, safe and positive culture in CSIRO.

Function 4.2

Ensure CSIRO has sustainable operations, sites and infrastructure.

Key Performance Indicators (KPIs)*:

- value of benefits created for Australia
- effective collaboration with research and development sector
- CSIRO's contribution in lifting Australia's science capacity
- customer satisfaction
- CSIRO recognised as a trusted advisor
- research community access, as well as effective use of world-class facilities and collections
- research valued by academia
- national benefits of international projects and activities
- cultural health
- science and technology is adopted and creates value for industry
- strategic investments by SIEF to address national challenges
- staff safety, health and wellbeing.

Maintaining the health of the Great Barrier Reef.

The Great Barrier Reef is a global icon and home to a wealth of marine biodiversity unmatched anywhere in the world. Effective conservation and management of the reef depends on quality science and decision-making. Recently, our scientists have been collecting data about the reef's physical and biological processes to sustain and protect this treasured icon.

04

Objectives

Our objectives help us deliver on our purpose and respond to the internal and external environment.

Objective 1

Conduct and encourage the uptake of world-class scientific research.

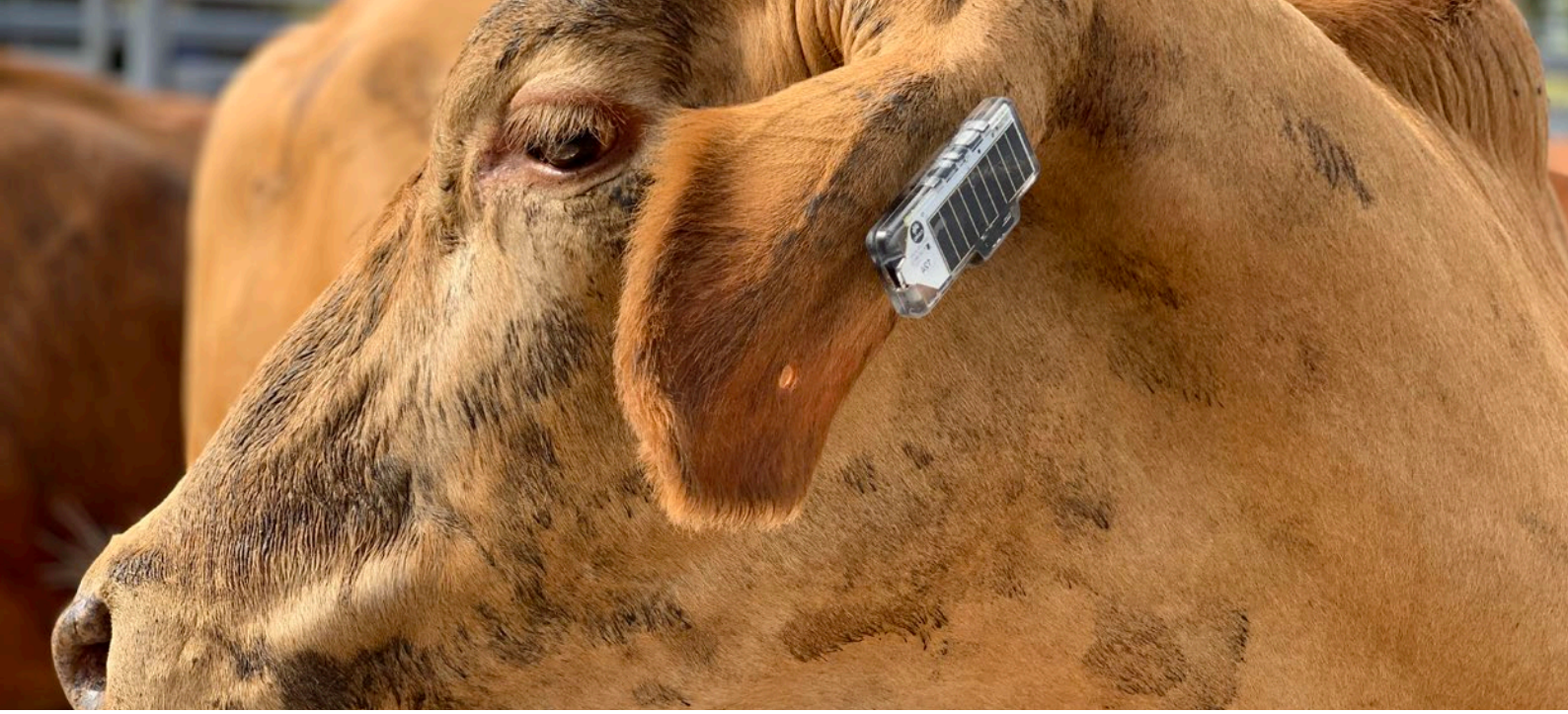
We deliver on this objective through our Business Units and Future Science Platforms.

Business Units

- **Agriculture and Food**
- **Data61**
- **Energy**
- **Health and Biosecurity**
- **Land and Water**
- **Manufacturing**
- **Mineral Resources**
- **Oceans and Atmosphere**

Future Science Platforms

- **Active Integrated Matter**
- **Artificial Intelligence and Machine Learning**
- **Deep Earth Imaging**
- **Digiscape**
- **Environomics**
- **Hydrogen Energy Systems**
- **Precision Health**
- **Probing Biosystems**
- **Space Technology**
- **Synthetic Biology**



Function 1.1: Conduct and facilitate the uptake of excellent scientific and technology solutions to deliver impact to the nation.

We deliver on this function by:

- conducting scientific research aligned to key national and global challenges and encouraging or facilitating the application or utilisation of the results
- establishing collaborations and multidisciplinary research partnerships (with public and private sector organisations, other publicly funded research agencies, universities and schools) to integrate the best solution for our customers
- providing products, and technical and advisory services to industry and government including professional consulting and testing facilities.

Strategic focus areas for 2019–23:

- focusing our portfolio towards larger-scale challenges and missions
- investing more in frontier and cross-cutting science that reinvents and creates new industries for Australia
- developing strategic R&D partnerships and delivering excellent customer experiences
- supporting high potential SMEs to innovate and grow
- improving underpinning digital capability in CSIRO
- accelerating the scale and pace of commercialisation of publically funded research in Australia to deliver greater impact.

We're working with Ceres Tag to develop next generation ear-tags to track and monitor livestock, unlocking invaluable data for industry.

Key activities for 2019–20

Focus on challenges and missions

Six challenges: embed the challenge framework to more clearly focus investment efforts around larger-scale priorities including missions, enabled by digital, future science and technology, data, and our people.

Improve underpinning digital capability

Digital projects: fund emerging digital and data science and technologies to underpin our science capability to accelerate the pace and scale of our response to the challenges.

Managed Data Ecosystem: build a data ecosystem based on the Findable, Accessible, Interoperable and Reusable (FAIR) data management principles, initially for CSIRO but as an exemplar for and with input from the national research community.

Digital Academy: connect and build digital awareness, mindsets and capability within CSIRO and empower people to operate effectively and improve our ability to solve increasingly complex and adaptive problems.

Greater investment in emerging areas of science

Decadal Science and Technology Plan: focus our investment on transformative, cross-cutting future science to address multiple challenges and create sustainable new industries.

Greater commercialisation focus

Commercialisation Marketplace: develop a new Commercialisation Marketplace to give industry visibility of our work and facilitate collaboration to get solutions from science out into the world.

Commercialisation pathways: develop commercialisation pathways to take our research to market through models such as joint ventures, spinouts, licensing and research for equity.

Industry engagement

ASX100 and SME engagement: develop strategic engagement with Australian SMEs and ASX100 to raise awareness of our work, and facilitate research collaborations and uptake of our technologies.

Property and infrastructure plan: in collaboration with innovation and industry partners, develop and implement a strategic site and infrastructure utilisation plan for CSIRO.

Outcomes

- The application of research benefits the Australian economy, society and environment.
- The provision of timely advice, information, and specific solutions inform and protect society and the environment.
- New knowledge and solutions are available to be used by academia, government and customers.
- Strong relationships with universities and other research organisations enhance Australia's innovation capacity.
- We are trusted as the national science agency and have a reputation for world-class pioneering research.

KPIs and targets

OUTCOME KPI	METRICS	TARGETS 2019–20	2020–21	2021–22	2022–23
Impact: value of benefits created for Australia.[a]	Demonstrated value of benefits underpinned by an increasing annual portfolio of externally validated impact case studies capturing triple bottom line impacts.	Evidence of maintained or increased impact	Evidence of maintained or increased impact	Evidence of maintained or increased impact	Evidence of maintained or increased impact
Customers are satisfied, as reported by increased numbers of them.[b]	Customer Net Promoter Score (NPS) maintained with increased survey sample.	NPS +40	NPS +40	NPS +40	NPS +40
Research is recognised as excellent, referenced and used by academia.	Normalised Citation Index (NCI).[c]	NCI 1.5	NCI 1.5	NCI 1.5	NCI 1.5
Science and technology is adopted and creates value for industry.	Mixed methods quantitative assessment of equity portfolio; 3-year rolling average of revenue from intellectual property (i.e. royalties, licensing); spin-out companies established and the creation of new SMEs facilitated.	Maintain or increase performance across each method	Maintain or increase performance across each method	Maintain or increase performance across each method	Maintain or increase performance across each method
Effective collaborative relationships with the R&D sector.	Demonstrated evidence of the value created from deep R&D collaborative relationships with mixed methods including joint publication, formal partnerships and qualitative assessment.	Evidence of the value created in a collaboration from a mixed methods assessment	Evidence of the value created in a collaboration from a mixed methods assessment	Evidence of the value created in a collaboration from a mixed methods assessment	Evidence of the value created in a collaboration from a mixed methods assessment
CSIRO is recognised as a trusted advisor.	Business Sentiment Survey: awareness of potential to work directly with CSIRO and knowledge of CSIRO.	Increase year-on-year	Increase year-on-year	Increase year-on-year	Increase year-on-year

a. Over the four years, the annual portfolios of impact case studies shall increase to broaden the body of evidence, from 25 to 40 per year to demonstrate impact and from two to six per year to demonstrate national benefit.

b. NPS targets are set to 'maintain' current level of results while CSIRO focuses on increasing the number of responses/sample size to further validate the already relatively high result.

c. A standard international metric in the form of an index relative to the global average indicated by 1.0. It represents the rate of citation of CSIRO publications by other authors, normalised by field of publication. A result of 1.50 indicates 50 per cent more citations than the global average in the relevant fields.

Function 1.2: Connect to global science, technology and innovation to access new opportunities for Australian innovation.

We deliver on this function by:

- accelerating the overall rates of international engagement, operations and collaboration where there is a higher potential impact value return to Australia than available domestically
- prioritising key regions for sustained presence and development where there is clear intersection with our impact objectives and sustainable business opportunities.

Strategic focus areas for 2019–23:

- enhancing our global reputation as a world-leading research organisation, solving complex multidisciplinary challenges
- establishing CSIRO as a trusted science and innovation advisor and partner to government to support foreign policy agenda
- providing links and innovation support to Australian SMEs and start-ups to access global value chains
- capturing and drawing innovation and R&D investment back to Australia
- ensuring global best practice governance and operations.

The Toyota Mirai, powered by ultra-high purity hydrogen, produced in Queensland using our membrane technology.

Key activities for 2019–20

Team Australia

Team Australia program: develop strategic government partnerships with the Department of Foreign Affairs and Trade (DFAT), Austrade and the Department of Industry, Innovation and Science to address complex multidisciplinary regional challenges.

Australia to the world: prioritise sector-based operations in partnership with industry and government to showcase Australian capability on the global map.

Access to global markets

Co-location models: provide a physical platform for Australian SMEs to access global markets, and a platform for international companies looking to access Australian innovation capability.

Access to global value chains: support partner SMEs and start-ups with a structured approach to technology and capability, and access to global value chains to increase their market reach and competitiveness.

Capturing global investment

Leveraged research investment program: focus our research investment into major regional programs to generate a higher return on investment.

Infrastructure utilisation and investment: develop and implement initiatives to increase the utilisation of our world-class infrastructure assets by global players.

Innovation investment: develop and implement initiatives to attract investment for our innovation from global corporate ventures and venture capital firms.

Global best practice models

Global capable workforce: develop and implement global capability building initiatives to ensure our workforce is globally equipped and relevant.

Outcomes

- We are recognised as being part of 'Team Australia' in global markets' access to world-class capability and talent.
- Linkages for our Australian SMEs and domestic university partners to global markets.
- Increased value creation for our innovations and services.

KPIs and targets

		TARGETS			
OUTCOME KPI	**METRIC**	**2019–20**	**2020–21**	**2021–22**	**2022–23**
National benefits of international projects and activities.[a]	Demonstrated by an increasing annual portfolio of impact case studies on global activities, with specific assessment of the value created and national benefit.	Evidence of national benefit demonstrated by case studies	Evidence of national benefit demonstrated by case studies	Evidence of national benefit demonstrated by case studies	Evidence of national benefit demonstrated by case studies

a. Over the four years, the annual portfolios of impact case studies shall increase to broaden the body of evidence, from 25 to 40 per year to demonstrate impact and from two to six per year to demonstrate national benefit.

Function 1.3: Manage funding directed to industrial scientific research activities, commercialisation of technologies and assistance to industry through research collaboration and capacity building.

We deliver on this function by*:

- CSIRO Innovation Fund, managed by Main Sequence Ventures investment in start-up and spin out companies, existing SMEs engaged in translation of research, and company formation opportunities to support business growth and a culture of innovation and entrepreneurship in Australia
- Science and Industry Endowment Fund grants to science and scientists for the purposes of assisting Australian industry, furthering the interests of the Australian community and contributing to solving national challenges.

* The CSIRO Innovation Fund, managed by Main Sequence Ventures and SIEF are independent from CSIRO.

Strategic focus areas for 2019–23:

- stimulating research, innovation and entrepreneurship across the Australian innovation system
- supporting a portfolio of deep technology companies to achieve their long-term goals
- being the investor of choice for Australian deep technology entrepreneurs
- encouraging STEM uptake in education and training, and retaining talent in STEM industries.

Using robotics and digital technology, we're creating Australia's future industries and jobs.

Key activities for 2019–20

CSIRO Innovation Fund

Future portfolio of companies: the CSIRO Innovation Fund, managed by Main Sequence Ventures will grow and support a portfolio of companies that solve the greatest challenges.

Partners and investors: expand the number of universities and internal Business Units as partners and investors with the Fund.

New collaborative opportunities: build collaborative opportunities between portfolio companies, CSIRO and others via Cooperative Research Centres' project grants and similar.

Science and Industry Endowment Fund (SIEF)

Experimental Development Program: address the existing funding gap in progressing experimental research and technology development to a stage where it attracts commercial investment and market uptake.

Generation STEM program: identify new programs to implement and scale the current program beyond the initial priority area, Western Sydney, to regional locations to help promote the development and retention of STEM skills in New South Wales (NSW).

The Future National Information and Communications Technology (ICT) Industry Platform program: fund research related to the three key areas: supply chain integrity, energy and data-driven cities.

Outcome

- Australian industries maintain and improve their competitiveness through the application of new technologies and solutions.

KPIs and targets

OUTCOME KPI	METRICS	TARGETS 2019–20	2020–21	2021–22	2022–23
Strategic investments by SIEF in scientific research to address national challenges for Australia.	Technologies receiving ongoing commercialisation support from venture capital or industry sources one year after completion of the SIEF Experimental Development Program.	Evidence of ongoing support and impact as measured through case studies	Evidence of ongoing support and impact as measured through case studies	Evidence of ongoing support and impact as measured through case studies	Evidence of ongoing support and impact as measured through case studies
	SIEF NSW Generation STEM program participant awareness of STEM careers and pathways in NSW.	7% increase on the 2018–19 baseline	8% increase on the 2018–19 baseline	9% increase on the 2018–19 baseline	10% increase on the 2018–19 baseline
	Impact evidence in narratives and evaluations demonstrating SIEF-funded challenges are creating new Australian technology-based industries and/or applied technology platforms that can reach global scale.	Evidence of impact as measured through case studies	Evidence of impact as measured through case studies	Evidence of impact as measured through case studies	Evidence of impact as measured through case studies

Objective 2

Mobilise and develop the best talent, for the benefit of Australia.

We deliver on this objective through our Services line of business.

- **Education and Outreach**
- **CSIRO Publishing**
- **SME Connect**
- **CSIRO Futures**
- **Infrastructure Technologies**

Function 2.1: Promote STEM capability, development and education.

We deliver on this function by:

- providing opportunities for students and teachers to develop and improve STEM skills including access to mentors
- offering education and outreach activities to increase knowledge of STEM and its application to students, parents, teachers and the Australian community
- publishing a variety of content including journals, books and magazines to support an increased knowledge of science and its application
- working with SMEs to develop capability both within industry and the research sector to support innovation in SMEs.

Strategic focus areas for 2019–23:

- providing high-quality STEM programs for teachers, students and community
- improving Indigenous STEM studies and employment
- enhancing early career researchers' industry engagement
- increasing STEM for SMEs
- producing quality publishing for researchers, professionals and community.

We're passionate about inspiring the next generation of STEM professionals.

Key activities for 2019–20

Education and Outreach

Indigenous STEM education: develop a sustainable model for the Indigenous STEM program including seeking new funding sources; successfully implementing the Indigenous Girls' STEM Academy including running the first five year 8 camps; and scoping a CSIRO Aboriginal and Torres Strait Islander education strategy.

Increase engagement of STEM professionals: transition the STEM Professionals in Schools to the enhanced model including 'how to' guides for best practice industry engagement with schools; investigate system for matching mentors for gold and silver Creativity in Research, Engineering, Science and Technology projects; researchers in Future Science Platforms working with teachers and students on research projects; Educator on Board program with major national research facilities.

Generation STEM program: identify new programs to implement and scale the current program beyond the initial priority area, Western Sydney, to regional locations.

Sustainable business and funding models: inform future strategy and priorities and develop aligned sustainable business and funding models to increase sustainability, efficiency and impact of CSIRO education programs.

SME Connect

SIEF STEM+ Business: development program for early career researchers to build their capability in industry engagement through the delivery of two to three-year research and development projects to SMEs. The program includes development days for researchers to enhance their industry engagement skills and prepare them for a career in STEM beyond the engagement.

CSIRO Kick-Start: strengthen the capability for CSIRO researchers to work effectively with Australian start-ups.

Innovation connections: provide ongoing learning events to SME businesses in metro and regional Australia to create awareness of technology developments in their sector and to drive utilisation of STEM within these companies.

Publishing

Children's publishing: introduce 4–15 year olds to science and technology concepts through age-appropriate storytelling.

Outcomes

- Australia's science capacity is increased, which helps the nation to remain innovative and competitive in science.
- Increased awareness and understanding of science and its potential benefits to the community and industry.
- Increased industry participation in CSIRO education and outreach activities.

KPIs and targets

		TARGETS			
OUTCOME KPI	**METRIC**	**2019–20**	**2020–21**	**2021–22**	**2022–23**
CSIRO's contribution to help lift Australia's science capacity and capability through STEM funded, developed and delivery of education programs.	Demonstrated contribution to national scientific literacy through delivery of STEM programs as evidenced by an annual program evaluation of STEM program delivery.	Evidence of contribution to scientific literacy	Evidence of contribution to scientific literacy	Evidence of contribution to scientific literacy	Evidence of contribution to scientific literacy

Objective 3

Manage national research infrastructure for the nation.

We deliver on this objective through our facilities and collections.

- **Australian Animal Health Laboratory (AAHL)**
- **Australia Telescope National Facility (ATNF)**
- **Marine National Facility (MNF)**
- **Pawsey Supercomputing Centre (Pawsey)**
- **National Research Collections Australia (NRCA)**
- **Atlas of Living Australia (ALA) and associated bio-collections in CSIRO**

Function 3.1: Ensure utilisation of national facilities and collections.

We deliver on this function by:

- hosting world-class science-ready research facilities and biological collections available for use by the national and international science community across government, academia and industry
- advising on the identification of facility needs and the design and creation of new national infrastructure.

Strategic focus areas for 2019–23:

- AAHL national and global networks and improved capability for South East Asia
- ATNF leadership for operation of the Square Kilometre Array (SKA), international partnerships and collaborations in space and astronomy
- MNF capability plan implemented and supporting cutting-edge, ocean-based science
- supercomputing leadership for Australia and creation of a recognised Asian supercomputing zone
- new facility for biological collections and digitisation of the collections
- ALA next generation infrastructure.

Our ASKAP radio telescope in outback Western Australia. Thirty-six separate dishes work together, along with new receiver technology, enabling astronomers to survey the Universe faster than ever before. As part of our Space Technology Future Science Platform, we aim to identify and develop our science to leapfrog traditional technologies and find new areas for Australian industry to work in.

Credit: Alex Cherney.

Key activities for 2019–20

Australian Animal Health Laboratory

Deliver enhanced collaboration with key internal and external stakeholders on emerging infectious diseases and build capability in preclinical trials in animal models. Expand international networks to enhance our capabilities and share knowledge on biological risk management, animal welfare, virology and under research collaboration. Strengthen the laboratory capacity in the Indo-Pacific region in collaboration with DFAT.

Australia Telescope National Facility and space

Bring new facilities online: commence astronomy surveys with the Australian Square Kilometre Array Pathfinder (ASKAP) telescope, operate Australia's share of the NovaSAR satellite as a national facility and integrate the European Space Agency's spacecraft tracking station at New Norcia into observatory operations.

Marine National Facility

Finalise and evaluate the transition to increased 300 days at sea operations.

Pawsey Supercomputing Centre

Deliver the $70 million technical upgrade of Pawsey's supercomputer compute capability and meet the expected needs of Pawsey's users over the next five years including for the ASKAP Pathfinder and Murchison Widefield Array telescopes, and work closely with the SKA to incorporate their future requirements.

National Research Collections Australia

Increase the rate of specimen digitisation to 150,000 per year, to make data more available to the scientific community for research and education.

Atlas of Living Australia

Deliver the ALA five-year strategic roadmap informed by a robust national stakeholder consultation process and complete the ALA data quality framework to provide customers confidence in the veracity of our data.

Outcomes

- World-class facilities and collections are available to be accessed and used effectively by the research community and public.

KPIs and targets

		TARGETS			
OUTCOME KPI	METRIC	2019–20	2020–21	2021–22	2022–23
World-class facilities and collections are made available for access by the research community and used effectively.	Facilities and collections achieve a threshold rate of successful usage, with lost time minimised.*	Achieve or exceed usage rates	Achieve or exceed usage rates	Achieve or exceed usage rates	Achieve or exceed usage rates

*This metric summarises the achievement of the threshold rates of usage and lost time as defined in detail for each facility in our PBS.

Objective 4

Ensure the sustainability of CSIRO.

We deliver on this objective through our support services.

- **Global**
- **Business Development and Commercial**
- **Corporate Strategy**
- **Finance**
- **Business and Infrastructure Services**
- **Corporate Affairs**
- **Information Management and Technology**
- **Governance**
- **Human Resources**
- **Organisational Development**
- **Health, Safety and Environment**
- **Science Impact and Policy**

Function 4.1: Ensure a vibrant, safe and positive culture in CSIRO.

We deliver on this function by:

- understanding our future workforce needs and ensuring we have the right capabilities (including leadership) at the right time
- supporting our people to thrive and to value their health, safety and wellbeing
- shifting the needle on all elements of our cultural vision and continue to invest in our leaders
- attracting, developing and retaining the nation's best and brightest to solve complex, emergent challenges for Australia's prosperity into the future.

Strategic focus areas for 2019–23:

- unlocking the potential of our culture
- delivering the best talent at the right time into the future
- transforming people and practices for a digital future
- transitioning to a culture where we prioritise people, and health and safety.

Broccoli latte: one of our solutions to achieving sustainable food security. With Hort Innovation, we developed a powder made from imperfect-looking broccoli that would have previously been wasted. We experimented with adding the broccoli powder to coffee to help tackle the issues of food loss and poor diets.

Key activities for 2019–20

People and digital practices

Career development: establish career development and mobility programs to build customer knowledge, deepen relationships and facilitate national and global collaboration.

Staff opportunities: focus on enhancing workforce flexibility and mobility to address strategic challenges including overseas posting of staff, use of locally engaged overseas staff and secondment from industry into CSIRO and for researchers into industry.

Tracking issues: merge existing approaches to create a single, streamlined system to manage and track people issues to ensure timely, effective resolution.

Health and safety

Safety and wellbeing: extend our safety and wellbeing program (including Thrive Wellbeing program) to drive a culture where our people prioritise their health, safety and wellbeing.

Workforce planning and talent management

See page 55 for details.

CSIRO culture

Cultural vision: continue evolving the cultural vision to guide our behaviours and develop a cohesive set of CSIRO values aligned with our rolling strategy.

Diversity and inclusion: implement the Diversity and Inclusion strategy and deliver the Science Australia Gender Equity action plan and the Reconciliation Action Plan.

Indigenous talent: develop Indigenous talent pipelines through engagement with universities and the development of an online talent pool, and attract and retain Indigenous employees through adequate mentoring and support.

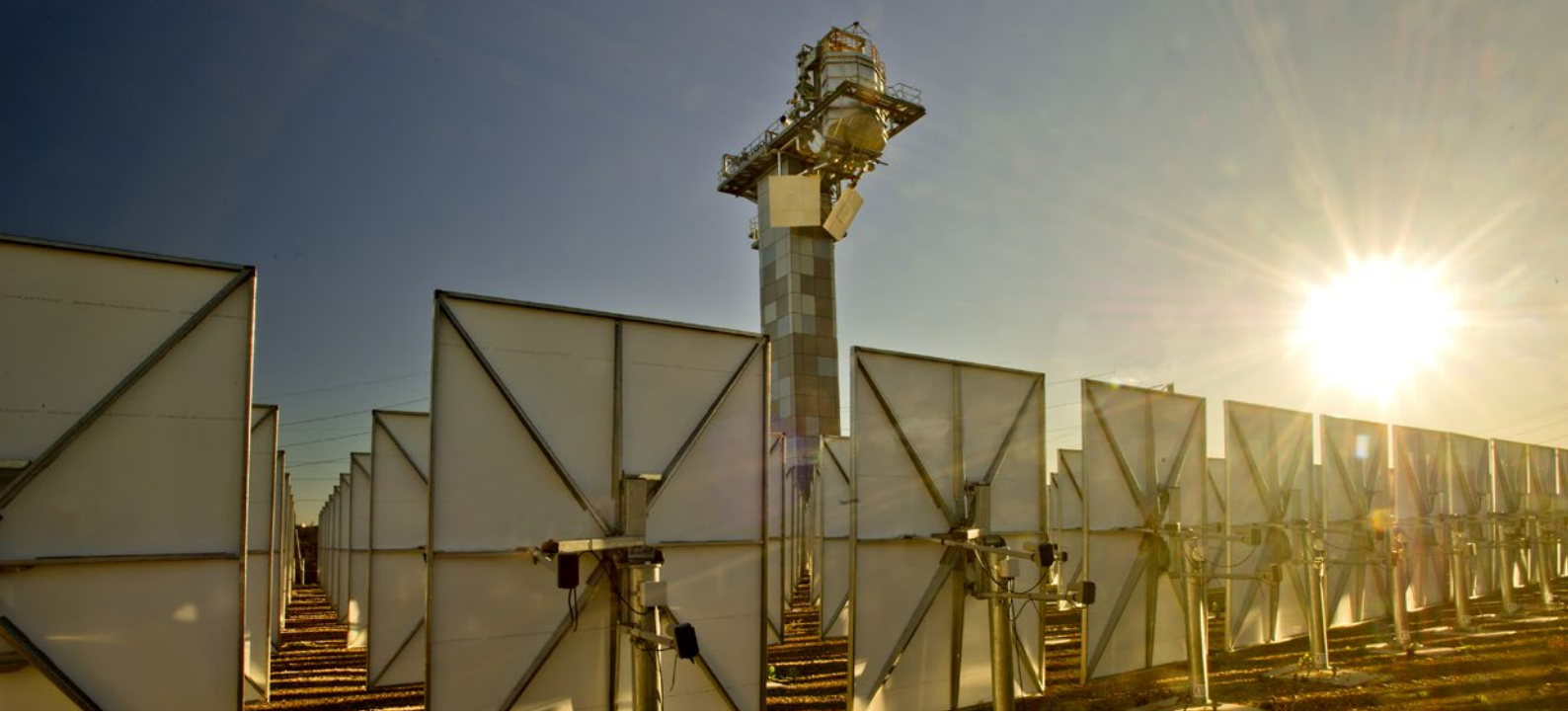
Outcomes

- Our staff are engaged and empowered in their work.
- Our innovation culture and operations enhance the wellbeing of our staff.
- Our workforce is inclusive, harnessing the full potential of our people.

KPIs and targets

		TARGETS			
OUTCOME KPI	**METRICS**	**2019–20**	**2020–21**	**2021–22**	**2022–23**
Staff safety, health and wellbeing	Staff Survey: staff wellbeing responses	70	71	72	73
	Hazard reporting *(number of hazards recorded by staff in the health, safety and environment system)*	720	1080	1440	1800
Cultural health	Staff Survey: Sustainable Engagement Score	80%	81%	81%	82%
	Diversity in leadership: proportion of female leaders (as defined by organisation role)	33%	34%	35%	36%

CSIRO Connect in Brisbane: we bring people together from across the organisation to share different perspectives and contribute to achieving our strategic and cultural goals.



Function 4.2: Ensure CSIRO has sustainable operations, sites and infrastructure.

We deliver on this function through finance, governance, information management, property and corporate affairs services to support the research and innovation activities, protect our brand, and strengthen our reputation with key stakeholders.

Strategic focus areas for 2019–23:

- maintaining an efficient property footprint, to create a more collaborative environment and reduce operating costs
- establishing effective communications with government, industry and community
- developing secure and effective systems and platforms to underpin our science.

Our research into low emissions technologies such as concentrating solar thermal, will ease the transition to a reliable, net zero emissions energy future at the lowest cost.

Key activities for 2019–20

Property

CSIRO's 2019–29 property strategy: implement year one of the ten-year property strategy.

Communication

External engagement: implement focused engagement strategies for major audiences (government, industry and community) to increase understanding of the national benefit we bring to Australia.

Security

Secure CSIRO: implement the refreshed Enterprise Security Framework to safeguard our people, property and systems.

Finance

Capital management: review and improve our asset management practices to improve the sustainable management of our scientific, system and infrastructure assets.

Platforms and systems

Enhance the science agenda: move from pilot to functional project delivering an assured multi-cloud service for our research.

Support business processes: continue to support the digitisation of corporate processes.

Transform service delivery: support assured collaboration, organisational flexibility and information governance through the rollout of Office 365 for all staff.

Embed security into all information and management technology services: deliver a change program to enhance our cyber security capability.

Outcome

- We have efficient and sustainable operations and are able to move quickly to address opportunities, thus maintaining our capacity to innovate for Australia.

KPIs and targets

Please refer to the Business Sentiment Survey and Customer Net Promoter Score KPIs on page 25 under Function 1.1.

To maximise the impact of our science and benefit to Australia, we must understand all scientific, environmental, financial, commercial and legal, health, safety and security, and reputational risks.

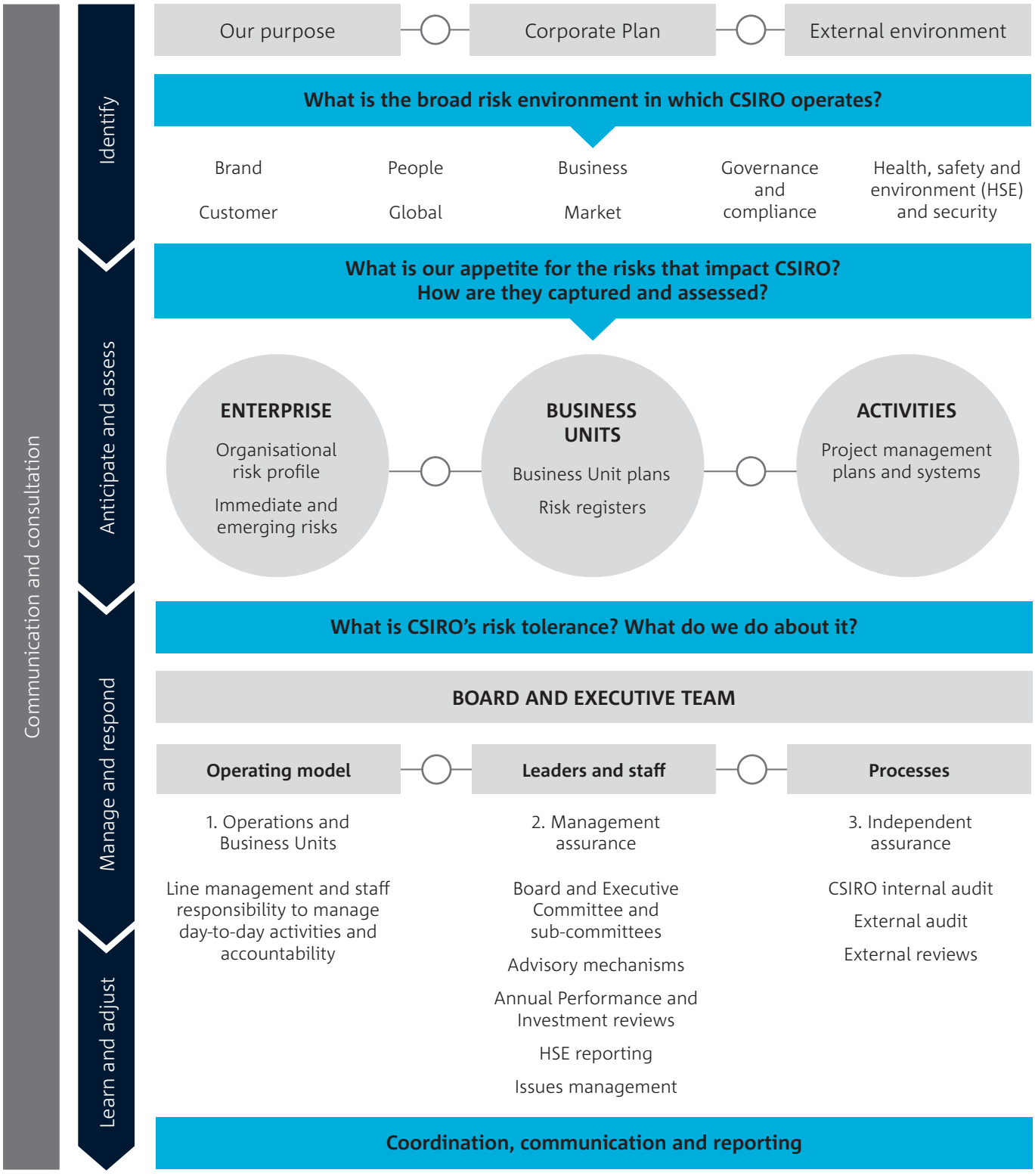
05

Risk management

Identifying and managing risks are central to delivering on our purpose and objectives.

5.1 Risk management framework

How risks are managed in CSIRO



The identification and management of risk is central to delivering our purpose and objectives and – in turn – maximising the impact of our science and benefit to Australia. This includes understanding scientific, financial, commercial and legal, health, safety and security, environmental, and reputational risks.

By actively identifying and managing strategic, operational and external risks we aim to increase our effectiveness as an organisation and provide greater certainty and confidence for government, staff members, collaborators, partners, and other stakeholders in the community about our operations. Our risk framework, methodology and approach is grounded in and aligned with both the international standard AS/NZS ISO 31000 Risk Management Principles and Guidelines and Commonwealth Risk Management Policy. Our risk framework is applied at the Enterprise, Business Unit and activity levels as illustrated on the previous page.

The CSIRO Board is also active in supporting our efforts to identify and manage our risks though three Board standing committees:

- People, Health and Safety Committee assists the Board to fulfil its governance responsibilities in relation to organisational development, people-related activities, and health and safety.
- Audit and Risk Committee assists the Board in the areas of financial management, risk management internal control, and compliance.
- Science Excellence Committee assists the Board to endorse, oversee, and monitor the implementation of our strategic plans with respect to maintaining and growing our scientific excellence, its connection to delivering impact, and our role as innovation catalyst in the national innovation system.

5.2 Strategic risks

Our most critical strategic and operational risks are summarised in the table below. These risks, along with significant immediate and emerging risks and issues are regularly reported and discussed at the executive level and within Business Units and functional areas.

KEY RISK	RELATIVE RISK APPETITE AND TOLERANCE
Failing to prioritise our science to deliver the greatest impact in a dynamic global and national context. Failure to fully recognise the global, national and policy context in which CSIRO operates, and to plan, invest and collaborate such that Australia's investment in CSIRO as a multidisciplinary science organisation delivering impact to Australian industry and the community is maximised.	CSIRO has a relatively high appetite and tolerance for risks associated with the breakthrough science and global collaboration required to achieve impact and benefit for the nation. But in doing so we have very low tolerance for risks that compromise the health and safety of our people and the integrity of our science and commercial dealings.
Failing to develop and adopt strategies necessary to ensure the fundamental enabling elements of the organisation are optimised to successfully achieve relevance and impact: • culture • business model • financial sustainability • scientific infrastructure • governance, business processes and systems.	We have a high risk appetite to: • empower and trust our people to act autonomously, balanced with a commensurate level of accountability • achieve adaptability and agility in responding to our customers at the speed of business • incur a short-term financial loss in pursuit of our innovation agenda and securing initiatives that provide opportunity for annuity revenue. However, we have a very low or zero tolerance for: • deliberate or reckless breaches of legal and regulatory obligations and the CSIRO Code of Conduct • compromising processes that support good governance and efficient use of organisational resources • the ineffective, inefficient, uneconomical or unethical use of the resources entrusted to the organisation by government and other funders.
Failing to maintain a safe and secure operating environment through managing: • health, safety and environment • physical, protective and cyber security • biosecurity and safety.	We have a high risk appetite to empower and trust our people to act autonomously in delivering innovative solutions for our customers and that in return, they will accept the commensurate level of accountability including adherence to legislation and policy. However, we have no tolerance for: • actions and behaviours that endanger and undermine staff wellbeing and workplace safety • inaction on unacceptable HSE risks even if the required action impacts project timeframes, cost or customer expectations • people failing to act in good faith and in the best interests of CSIRO or deliberately or recklessly breaching our legal and regulatory obligations • employees engaging in unethical behaviour or behaviour against inclusion and diversity, irrespective of their criticality to project and organisational outcomes.
Failing to conduct our science and business activities with integrity and in a manner that upholds CSIRO's Code of Conduct.	

(LOW – HIGH)	HOW WE MANAGE RISKS
	The risk is managed through controls and mitigation strategies that include: • an enterprise investment planning process to achieve a research portfolio that balances national interest and commercial focus • achievement of planned outcomes is measured against the achievement of KPIs and monitored through CSIRO's Planning and Performance Framework • the application of CSIRO's Governance and Policy Framework provides further support in achieving planned outcomes, especially in managing activities in contentious areas. CSIRO continues to strengthen its response to this risk through developing new strategies and initiatives through a rolling strategy process.
	The risk is managed through a range of organisational initiatives that are focused on: • culture change programs supporting change in the way we collaborate, communicate and deliver impact through science • leadership appointments and priorities to support achievement of culture change objectives • development and execution of medium and long-term strategies to support the application of different business models within existing Business Units and in supporting new initiatives • specific Executive Team endorsed strategies and initiatives to support long-term financial sustainability and the 10-year evolution of CSIRO's property portfolio.
	Risks related to safety and security are managed through an extensive array of existing frameworks and controls at the enterprise, Business Unit and activity levels. These are routinely enhanced through regular internal and external reviews and the implementation of recommended actions.
	Scientific integrity is underpinned by extensive controls including peer review of science, ethics and publication approvals. The conduct of CSIRO's business operations is subject to the application of CSIRO's governance and accountability frameworks and mechanisms. The policies, processes and systems underpinning these are subject to regular internal and external reviews.

Risk appetite Risk tolerance

5.3 Reviewing and improving our risk management

Over the next four years, we will continually strengthen and increase our risk maturity.

Risk culture

Consistent with the development of a positive culture to deliver innovation, we are developing a culture towards the identification and management of risk that supports the posture that you can take risk where this is done mindfully, within organisational tolerances and is managed effectively.

Integration

Risk is aligned with key processes to enable decision-making. We continue to strengthen that alignment by increasing risk capability applied to each element of our strategic planning and execution framework.

Risk capability

While risk planning and management has been very visible at Board, Executive Team and senior leader levels – and in our Enterprise Support Services – cascading it to Business Units and projects has been inconsistent. This is being addressed through an enhanced focus on risk reporting at the enterprise level, supported by a regular update and review of risk registers across all Business Units and Enterprise Support areas.

Resilience

Our ability to respond to significant issues and events has been strengthened through the review and update of the situation management framework in 2016. We continue to enhance our design and application of our situation management framework in responding to external risks and events. This includes running scenario-based exercises at all levels.

The Active Integrated Matter Future Science Platform harnesses digital technology, autonomous systems, and materials science to deliver the transdisciplinary scientific breakthroughs needed for Enlightened Industry, or Industry 5.0.

We're monitoring flying foxes in far north Queensland as part of our work in ensuring resilient and valuable environments.

06

Capability

Our extraordinary people bring our excellent science to life.

6.1 Staff numbers

Our extraordinary people are critical to our success and bring our excellent science to life. We have people working across the entire spectrum of research, science and commercialisation.

Our average staffing level is anticipated to remain within a narrow variation range over the strategy period. Based on indefinite, term and casual employees, at 30 June 2019 we had 5,914 staff, a full-time equivalent of 5,358. Of these, 3,330 full-time equivalent or 62 per cent, were classified within the research function.

AVERAGE STAFFING LEVELS	2016–17	2017–18	2018–19	2019–20
Total average staffing levels full-time equivalent	4,913	5,094	5,239*	5,193

*as at 30 June 2019

At CSIRO we learn from each other, trust each other and collaborate in a supportive, inclusive environment.

6.2 Investment in future capability

Over the next four years, we will invest in our capability aligned to our strategic pillars and build on existing activities that underpin our objectives and purpose.

Capability programs aligned to our strategic pillars

Customer first

- Customer engagement skills
- Customer experience program

Science excellence

- Future Science Platforms

Thriving people and teams

- Build our culture with a safety and wellbeing focus
- Equip people for a digital future
- Drive innovation through diversity and inclusion

Global engagement for national benefit

- Cultural competencies
- Global compliance and risk
- Communities of practice

Collaborative networks

- Industry PhD
- Missions

Breakthrough innovation

- ON program
- Managed Data Ecosystem

Customer first

Customer engagement skills

Build tactical skills, capability, and maturity with a focus on improved customer engagement, management of business relationships and opportunities, and delivery of customer value.

Customer experience program

The program continues to focus on improving the people, process, and systems that can impact a customer's experience with us. This includes enhancement of the customer relationship management system to identify industry trends, and plan and implement industry engagement around national challenges.

Thriving people and teams

Build our culture with a safety and wellbeing focus

Shape our culture, where the health and wellbeing of our people is a major focus to ensure people thrive and contribute their best work in delivering our strategy.

Equip people for a digital future

Connect and build digital awareness, mindsets and capability within CSIRO and empower people to operate effectively and improve our ability to solve the increasingly complex and adaptive problems. See Digital Academy under Function 1.1 on page 24.

Align our leadership capability at all levels of the organisation with our cultural vision and strategic pillars to support cross-boundary work within and beyond CSIRO in increasingly complex work environments.

Drive innovation through diversity and inclusion

Enhance CSIRO's performance against diversity and inclusion goals, with a focus on increasing gender and cultural diversity in middle and senior leadership positions, as well as the number of Aboriginal Australians and Torres Strait Islander peoples at CSIRO.

Collaborative networks

Industry PhD

The industry-focused research training program is rolled out with university and industry partners to shape the future of industrial research training in Australia and improve our nation's innovation capacity.

Missions

Under the Challenges and Digital Transformation Program, large-scale collaborative missions will amplify our capacity to solve the greatest challenges at scale enabled by investments in digital, future science and technology, data, and our people

Science excellence

Future Science Platforms (FSPs)

Our FSPs represent an investment in science that underpins innovation and has the potential to help reinvent and create new industries for Australia. The current FSPs will evolve to build a program of enabling and emerging transformative science and technology in support of our challenges and missions.

Global engagement for national benefit

Cultural competencies

Build our staff capability and confidence to engage with overseas markets, in particular China and other Asian nations.

Global compliance and risk

Build capability in staff to operate in overseas environments and maintain compliance with relevant Australian and international laws as well as our policy and procedures.

Communities of practice

Enhance the knowledge sharing with the organisation about working and engaging globally.

Breakthrough innovation

ON program

Our ON program is focused on improving Australia's innovation performance by helping research teams build their entrepreneurial competencies and collaborate more with industry and the broader innovation system to understand and address global challenges.

Managed Data Ecosystem

We will build a data ecosystem based on the FAIR data management principles, initially for CSIRO but as an exemplar for and with input from the national research community. Also see Function 1.1 on page 24.

6.3 Workforce planning initiatives

At CSIRO we continue building on our culture. We believe if we put our people first, they will thrive and contribute their best and in turn put our partners, customers and stakeholders first, allowing us to solve the greatest challenges on behalf of the nation.

Workforce planning and talent management

- Design a fit-for-purpose, robust talent management system for CSIRO to ensure we develop, retain and deploy the people, knowledge and skills we need into the future aligned to our strategy.
- Develop a strategic workforce plan for CSIRO, specifically to support our digital transformation, internal mobility and engagement models, to access capability beyond CSIRO to deliver against national challenges and missions.
- Create and deliver agile work groups, teams and approaches in support of our mission-directed, transdisciplinary and collaborative work.
- Review end-to-end recruitment processes to identify and secure high potential talent in an increasingly competitive market.
- Boost the early career researchers' pipeline by growing the existing talent pool of approximately 1,000 students and 270 postdoctoral fellows that we currently host and also exploring enhanced pathways between postgraduate studentships, postdoctoral fellows and the transition to more senior research roles.

This year we marched in the annual Sydney Gay and Lesbian Mardi Gras Parade to demonstrate that we are diverse, inclusive, imaginative and bold – and a great place to work, for everyone.

Going for gold.

We produced the country's first gold using a non-toxic chemical process in an effort to provide an alternative to cyanide and mercury to extract the yellow metal.

07

Appendix

1. Sustainable Development Goals: https://sustainabledevelopment.un.org/
2. CSIRO Futures – Translating science into strategy https://www.csiro.au/en/Showcase/CSIRO-Futures
3. *DHL Global Connectedness Index 2018 – The State of Globalization in a Fragile World*
4. AlphaBeta – *'Digital Innovation: Australia's $315b opportunity September 2018'*
5. Blackburn, S, Freeland, M & Gartner, D 2017, *Digital Australia: Seizing opportunities from the Fourth Industrial Revolution*, McKinsey & Company
6. Alpha Beta – *'Digital Innovation: Australia's $315b opportunity September 2018'*
7. ASEAN Investment Report 2018 – *'Foreign Direct Investment and the Digital Economy in ASEAN'*
8. Australian Government, Department of Foreign Affairs and Trade – *'Australia's goods and services by top 15 partners 2017–18'*
9. RDMAG 2019 – *'2019 Global R&D Funding Forecast'*
10. World Health Organization – *'Ageing and Health'*
11. WIPO 2019 – *Global Innovation Index 2019: 'Creating Healthy Lives – The Future of Medical Innovation'*
12. Innovation and Science Australia 2018 – *'Australia 2030: Prosperity through Innovation'*
13. Australia Bureau of Statistics – Gross Expenditure on R&D (GERD)
14. Innovation and Science Australia 2016 – '*Performance Review of the Australian innovation, science and research system 2016'*
15. Australia Bureau of Statistics – '*Research and Experimental Development Businesses, Australia, 2015–16'*
16. Innovation and Science Australia 2016 – '*Performance Review of the Australian innovation, science and research system 2016'*
17. Australian Government, Department of Industry, Innovation and Science 2018 – '*Science, Research and Innovation (SRI) Budget Tables 2018–19'*
18. Australian Government, Department of Industry, Innovation and Science, Office of the Chief Economist 2017 – '*Australian Innovation System Report 2017'*
19. Kennedy, Lyons & Quinn 2014, *'The continuing decline of science and mathematics enrolments in Australian high schools'*
20. Australian Centre for Educational Research, '*PISA 2015: A first look at Australia's results'*
21. Office of the Chief Scientist (2015) – '*STEM skills in the workforce: what do employers want?'*
22. Edelman (2018) *2018 Edelman Trust Barometer Global Report*, Edelman
23. Welcome Global Monitor – *Welcome Global Monitor 2018, How does the world feel about science and health?*

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