CSIR SHAREHOLDER'S COMPACT 2025/26

science, technology & innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

CSIR
Touching lives through innovation

80th anniversary

CONTENTS

LIST OF FIGURES

LIST OF TABLES

i. ACRONYMS

3D	Three dimensional
4IR	Fourth industrial revolution
AI	Artificial intelligence
AMTL	Advanced Material Testing Laboratories
API	Active pharmaceutical ingredient
ARC	Audit and Risk Committee
ATNS	Air Traffic Navigation Services
B-BBEE	Broad-Based Black Economic Empowerment
BD&C	Business Development and Commercialisation
BEI	Business Excellence and Integration
BIDC	Biomanufacturing Industry Development Centre
BIDF	Biorefinery Industry Development Facility
BIFN	BRICS Institute of Future Networks
BoD	Board of Directors
BRICS	Brazil, Russia, India, China and South Africa
CDC	Centre for Disease Control
CeNAM	Centre for Nanostructures and Advanced Materials
CEO	Chief Executive Officer
CF	Commercialisation fund
CFO	Chief Financial Officer
cGMP	Current Good Manufacturing Practice
CO_2	Carbon dioxide
CoGTA	Cooperative Governance and Traditional Affairs
Covid-19	Coronavirus disease 2019
CPAM	Collaborative Programme in Additive Manufacturing
CSD	Central Supplier Database
CSIR	Council for Scientific and Industrial Research
CSIR C^3	CSIR C-Cubed
DALRRD	Department of Agriculture, Land Reform and Rural Development
DBSA	Development Bank of Southern Africa
DERI	Defence Evaluation and Research Institute
DFFE	Department of Fisheries, Forestry and the Environment
DHM	Dynamic hydraulic model
DoD	Department of Defence

DMRE	Department of Mineral Resources and Energy
DSAC	Department of Sport, Arts and Culture
DSTI	Department of Science, Technology and Innovation
the dtic	Department of Trade, Industry and Competition
EE	Employment Equity
EEP	Employment equity plan
ERAs	Emerging research areas
ERM	Enterprise risk management
ERMS	Enterprise Risk Management Services
ERRP	Economic Reconstruction and Recovery Plan
EPIC	Excellence, people-centredness, integrity and collaboration
ESG	Environmental, social and governance
EU	European Union
Exco	Executive Committee
FATF	Financial Action Task Force
FPP	Fraud Prevention Plan
FPMP	Fraud Prevention and Management Policy
GCIS	Government Communication Information System
GDP	Gross domestic product
GRC	Governance, risk management and compliance
HC	Human Capital
HEIs	Higher education institutions
HIP	Hot isostatic pressing
HR	Human Resources
HRSEC	Human Resource and Ethics Committee
IBH	Industrial Biocatalysis Hub
ICASA	Independent Communications Authority of South Africa
ICT	Information and Communication Technology
IKS	Indigenous knowledge systems
IoT	Internet of things
IP	Intellectual property
IPOSS	Integrated Port Operations Support System
IPTN	Integrated Public Transport Network
ISO	International Organisation for Standardisation
IT	Information technology
KPIs	Key performance indicators
KSS	Knowledge sharing systems
LF	Learning Factory
LMDP	Leadership and Management Development Programmes

LoC	Lab-on-Chip
MDDV	Medical devices, diagnostics and vaccines
MESA	Manufacturing Enterprise Solutions Association
MerSETA	Manufacturing, Engineering and Related Services Sector Education and Training Authority
MMR	Mining and Minerals Resources
MICT	Media, Information and Communication Technologies
MTEF	Medium-term Expenditure Framework
MSc	Master of Science
NACI	National Advisory Council on Innovation
NDOH	National Department of Health
NEPAD	New Partnership for Africa's Development
NLP	NextGen Natural Language Processing
NHI	National Health Insurance
NHLS	National Health Laboratory Service
NICIS	National Integrated Cyberinfrastructure System
NIDF	Nanomaterials Industrial Development Facility
NMISA	National Metrology Institute of South Africa
NRF	National Research Foundation
NSI	National System of Innovation
NT	National Treasury
NWU	North-West University
OEM	Original equipment manufacturer
Opco	Operations Committee
PAIS	Precision agriculture information system
PhD	Doctor of Philosophy
PFMA	Public Finance Management Act, 1999 (Act 1 of 1999) as amended by Act 29 of 1999
PG	Parliamentary Grant (Baseline)
PoC	Point-of-care
PoPIA	Protection of Personal Information Act
PPE	Property, plant and equipment
PV	Photovoltaics
R&D	Research and development
RD&I	Research, development and innovation
RIR	Recordable incident rate
Rm	Rand in millions
RMP	Risk Management Plan
SA Army	South African Army
SaaS	Software as a service
SABC	South African Broadcasting Corporation

SADC	Southern African Development Community
SADiLaR	South African Centre for Digital Language Resources
SAHPRA	South Africa Health Products Regulatory Authority
SALGA	South African Local Government Association
SANAS	South African National Accreditation System
SANBio	Southern Africa Network for Biosciences
SANDF	South African National Defence Force
SANEDI	South African National Energy Development Institute
SANRAL	South African National Roads Agency Limited
SAPS	South African Police Service
SDGs	Sustainable Development Goals
SET	Science, engineering and technology
SETAs	Sector Education and Training Authorities
SGCs	Societal grand challenges
SHEQ	Safety, health, environment and quality
SMEs	Small and medium enterprises
SMMEs	Small, medium and micro enterprises
SOEs	State-owned enterprises
SOs	Strategic objectives
STI	Science, technology and innovation
STISA	Science, Technology and Innovation Strategy for Africa
TIA	Technology Innovation Agency
TIC	Technology Innovation Centre
TMM	Trackless mobile machinery
TOdB	Technical Outputs Database
TRL	Technology readiness level
TVET	Technical and Vocational Education and Training
UAVs	Unmanned aerial vehicles
UCT	University of Cape Town
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organisation
USA	United States of America
VRE	Variable renewable energy
Wits	University of the Witwatersrand

ii. THE SHAREHOLDER'S COMPACT

The Shareholder's Compact is a performance agreement between the Council for Scientific and Industrial Research (CSIR) and the Minister of Science, Technology and Innovation. It consists of the text of the Compact itself (Chapter 2) and a series of supporting annexures that cover the following aspects:

- **Strategic planning documents:**
  - Strategic Plan: 2025/26 – 2029/30 (Annexure A); and
  - Annual Performance Plan: 2025/26 (Annexure B).
- **Documents setting out the governance structures and risk management strategies of the CSIR:**
  - Governance Structures (Annexure C);
  - Risk Management Plan (Annexure D);
  - Fraud Prevention Plan (Annexure E); and
  - Materiality/Significance Framework (Annexure F).
- **Documents setting out the CSIR Financial Plan and CSIR's compliance with the applicable financial legislation:**
  - Financial Plan (Annexure G).

THE SHAREHOLDER'S COMPACT AGREEMENT

FOR THE CYCLE COMMENCING 1 APRIL 2025
MADE AND ENTERED INTO BY AND BETWEEN:
THE MINISTER OF SCIENCE, TECHNOLOGY AND INNOVATION

Prof. Blade Nzimande, in his capacity as Executive Authority,
being the responsible Cabinet member (hereinafter referred to as 'the Executive Authority')

and

THE CSIR BOARD

Vuyani Jarana in his capacity as Accounting Authority and
Chairperson of the CSIR Board (hereinafter referred to as 'the Accounting Authority')

WHEREAS:

The Parties wish to conclude a Shareholder's Compact to underscore a constructive working relationship between them, clarify mutual expectations that are to be satisfied, articulate the CSIR's role in support of the effective functioning of the National System of Innovation (NSI) and establish a framework of good corporate governance;

Treasury Regulation 29.2, issued under the Public Finance Management Act (PFMA), further requires the Accounting Authority of a Schedule 3B public entity to conclude a Shareholder's Compact with its Executive Authority annually; and

The CSIR Board is the organisation's Accounting Authority, and the Minister of Science, Technology and Innovation is its Executive Authority as the cabinet member responsible for the CSIR; the Parties have negotiated and reached an agreement on the contents of the Shareholder's Compact and wish to record the same in writing.

NOW, THEREFORE, THE PARTIES HEREBY AGREE AS FOLLOWS:

GLOSSARY OF TERMS

In this Shareholder's Compact, the following words and/or phrases shall have the following meanings:

Accounting Authority means the CSIR Board as established in terms of section 7 of the Scientific Research Council Act. **The Corporate Plan**, as embodied in Annexures A to G to this Shareholder's Compact, with:

- Annexure A being the CSIR Strategic Plan;
- Annexure B being the CSIR Annual Plan for the 2025/26 financial year;
- Annexure C being the CSIR Governance Structures
- Annexure D being the CSIR Risk Management Strategy (Plan);
- Annexure E being the CSIR Fraud Prevention Plan (FPP);
- Annexure F being the Materiality Framework;
- Annexure G being the Financial Plan (including the Budget and Cash flow for 2025/26; the Group's three-year Financial Plan and the three-year Borrowing Plan).

Annual Budget means the CSIR's annual budget as embodied in Annexures A, B and G.

Balanced Scorecard Framework means the Executive Authority's framework for evaluating the performance of science, engineering and technology (SET) institutes described in the DSTI publication entitled "Reviewing the science, engineering, technology and innovation scorecards," dated May 2003.

Basic Conditions of Employment Act means Act 75 of 1997.

B-BBEE Codes means the Broad-Based Black Economic Empowerment Codes as published in the Government Gazette from time to time.

EE Act means Act 55 of 1988.

Effective date means the effective date of this Shareholder's Compact, which shall be 1 April 2024.

Executive Authority means the Minister of Science, Technology and Innovation..

KPIs means the performance measures described in the Corporate Plan, against which the performance of the CSIR shall be evaluated.

Labour Relations Act means Act 66 of 1995.

Materiality Framework means the materiality framework as envisaged by clauses 6.3 and 13.1.5. below and as recorded in Annexure F.

Parties means the Executive Authority and the Accounting Authority, respectively.

PFMA means Act 1 of 1999.

PoPIA means Act 4 of 2013.

Shareholder's Compact means this document and all annexures thereto.

Scientific Research Council Act means the CSIR's enabling legislation, namely Act 46 of 1988.

Skills Development Act means Act 97 of 1998.

Treasury Regulations means any prescripts or legislative requirements, or practice notes issued by NT for implementation by government departments, trading entities, constitutional institutions and public entities, issued in line with the PFMA.

THE SHAREHOLDER'S COMPACT

This Shareholder's Compact represents the agreement between the Executive Authority of the CSIR, being the Minister of Science, Technology and Innovation, and the Accounting Authority of the CSIR, being the CSIR Board, herein represented by the Chairperson of the Board. It reflects the expectations of each of the Parties, expressed in terms of outcomes and outputs that need to be achieved during the financial year starting on 1 April 2025.

This Shareholder's Compact shall operate from the effective date and will be reviewed by the Parties at the end of the financial year ending on 31 March 2026.

LEGAL REQUIREMENT AND PRIMARY RELATIONSHIP BETWEEN THE SIGNATORIES

Chapter 29 of the Treasury Regulations imposes the following legal requirements on the Accounting Authority of a Schedule 3B public entity, such as the CSIR, and its Executive Authority, in terms of the conclusion of a Shareholder's Compact:

"29.2 Shareholder's Compact

29.2.1. The Accounting Authority for a public entity listed in Schedule 2, 3B or 3D must, in consultation with its Executive Authority, annually conclude a Shareholder's Compact.

29.2.2. The Shareholder's Compact must document the mandated key performance measures and indicators to be attained by the public entity as agreed between the Accounting Authority and the Executive Authority."

FRAMEWORK OF THE SHAREHOLDER'S COMPACT

In terms of section 3 of its enabling legislation, namely the Scientific Research Council Act, the mandate of the CSIR is as follows:

"The objects of the CSIR are, through directed and particularly multidisciplinary research and technological innovation, to foster, in the national interest, and in fields which in its opinion should receive preference, industrial and scientific development, either by itself or in co-operation with principals from the private or public sectors and thereby to contribute to the improvement of the quality of life of the people of the Republic; and to perform any other functions that may be assigned to the CSIR by or under this Act."

THE SHAREHOLDER'S COMPACT

The CSIR's strategic objectives (SOs) are outlined in the Corporate Plan, which incorporates the CSIR Strategic Plan and the CSIR Annual Plan for the 2025/26 planning cycle; the CSIR's Risk Management Strategy; the CSIR's FPP; the Materiality Framework; the Budget and Cash Flow for 2025/26; the Group's three-year Financial Plan and the organisation's three-year Borrowing Plan. The Accounting Authority undertakes to oversee the implementation of the said elements of the Corporate Plan.

INTERNAL TRANSFORMATION

In Annexure A, the Corporate Plan of the CSIR deals with matters relating to transformation, among others. In giving effect to the Corporate Plan, the Accounting Authority will ensure that the CSIR is in full compliance with all applicable legislation, such as, but not limited to, the EE Act, the Skills Development Act, the Labour Relations Act, the Basic Conditions of Employment Act, and the B-BBEE Codes.

THE ROLE AND POWERS OF THE ACCOUNTING AUTHORITY

The role and powers of the Accounting Authority are set out in sections 7(1), 11, 12 and 19 of the Scientific Research Council Act, read with section 3 of the Science and Technology Laws Amendment Act, 2014 (Act 7 of 2014).

In terms of section 56 of the PFMA, the Accounting Authority has delegated, in writing, certain of the powers entrusted or delegated to it to officials in the CSIR. To this end, the Accounting Authority has also adopted an approval framework, which governs the authorisation process in the CSIR. It deals with the development of strategic and operational plans and budgets, appointment of staff, approval of salaries and acquisition and disposal of assets, among others. It also defines authority levels in relation to organisational positions.

The Materiality Framework for reporting losses through criminal conduct and irregular, fruitless and wasteful expenditure, as well as for significant transactions as envisaged by sections 55 (2) and 54 (2) of the PFMA, is in place and is included as Annexure F attached hereto.

UNDERTAKINGS BY THE ACCOUNTING AUTHORITY OF THE PUBLIC ENTITY

- The Accounting Authority undertakes to act in accordance with the approved Corporate Plan attached hereto.
- In the event that the Accounting Authority will not be able to fully execute the plans as embodied in Annexure A, it will promptly and in writing, inform the Executive Authority accordingly to seek its advice prior to making decisions or taking action.
- The Accounting Authority confirms that it will comply with the provisions of sections 50 and 51 of the PFMA, as more fully dealt with in Annexures D, E and F attached hereto, as well as with the reporting requirements as embodied in the PFMA and the relevant Treasury Regulations.
- The Accounting Authority undertakes to ensure that the CSIR complies with its statutory mandate as encapsulated in section 3 of the Scientific Research Council Act.

UNDERTAKINGS BY THE EXECUTIVE AUTHORITY AS THE SHAREHOLDER

The Executive Authority undertakes to allow the Accounting Authority to manage the business of the CSIR as has been approved in the Corporate Plan through ensuring the following:

- Issuing of instructions and requests for information with sufficient prior notice and response times, with due cognisance that this will not be applicable in instances where Parliament requires the information and must be provided urgently;
- Not reneging on written guarantees and undertakings given;
- Providing the organisation with strategic direction and control; and
- Complying with the relevant provisions of the PFMA, as well as the Treasury Regulations insofar as the same relates to it in terms of the relationship between the Parties.

GOVERNANCE

The Accounting Authority recognises that systems of good corporate governance should be in place and reviewed continuously to ensure that they are sound and consistent with world-class standards and that they are and remain relevant to the business of the CSIR. Apart from complying with the provisions of the Scientific Research Council Act, the Science and Technology Laws Amendment Act, the PFMA, as well as the Treasury Regulations issued thereunder, and all other applicable legislation, the Accounting Authority shall also ensure compliance with the relevant provisions of the King IV Code on Corporate Governance (2016), and the Protocol on Corporate Governance in the Public Sector (2002) issued by the Department of Public Enterprises.

The Accounting Authority will strive to ensure that the CSIR upholds and sets in place review mechanisms and protocols to ensure that reports and publications, including public comments made by the employees of the CSIR, are based on sound scientific analysis, and do not bring the institution into disrepute.

KPIs LINKED TO THE BALANCED SCORECARD FRAMEWORK

The KPIs have been summarised according to the categories of the Balanced Scorecard Framework of the Department of Science, Technology and Innovation (DSTI) and reflect the SOs of the CSIR. The CSIR's SOs are explained in greater detail below.

The CSIR's KPIs provide an understanding of performance in terms of inputs, outputs, efficiencies and, to some extent, provide lead indicators of the outcomes and impact that are required for the CSIR to fulfil its mandate. The KPIs are aligned to the SOs and provide a basket of measures that reflect various aspects of organisational performance. The categories and their associated SOs are:

SO1: CONDUCT RESEARCH, DEVELOPMENT AND INNOVATION OF TRANSFORMATIVE TECHNOLOGIES AND ACCELERATE THEIR DIFFUSION

This SO seeks to ensure that the CSIR undertakes cutting-edge research, development and innovation (RD&I) in areas that will bring transformative change in the South African economy and society.

KPI 1: Publication equivalents

Research publications are a measure of the CSIR's research capabilities and outputs. The quantity and quality of peer-reviewed research publications are a measure of the quality and depth of the scientific knowledge base. Publication equivalents consist of peer-reviewed journal articles, peer-reviewed conference papers, peer-reviewed book chapters and books.

KPI 2: New priority patent applications filed

At the CSIR, priority patent filings serve as a pipeline indicator of patent families. A priority patent is the first patent application filed for the protection of a particular invention with the CSIR named as an applicant/assignee/co-applicant/co-assignee.

KPI 3: New patents granted

Patents provide a lead indicator of the potential impact to be achieved when technologies are commercialised. Patents are exclusive rights granted for inventions and are conferred by an examining patent authority with the CSIR named as an applicant/assignee/co-applicant/co-assignee.

KPI 4: New technology demonstrators

This is a measure of an intermediate output of RD&I activities with the potential to be developed further and that can be transferred to various markets for socioeconomic impacts. A prototype – a rough example of a conceivable technology (product or system) derived from existing knowledge gained from research and/or practical experience as proof of concept.

KPI 5: Number of technology licence agreements signed

This indicator is a measure of the uptake of CSIR intellectual property (IP) in the market. A licence is an agreement in terms of which the CSIR grants rights to another party to exploit IP developed by the CSIR, typically in exchange for royalty payments and/or other licence fees.

SO2: IMPROVE THE COMPETITIVENESS OF HIGH-IMPACT INDUSTRIES TO SUPPORT SOUTH AFRICA'S RE-INDUSTRIALISATION BY COLLABORATIVELY DEVELOPING, LOCALISING AND IMPLEMENTING TECHNOLOGY

This SO seeks to improve the competitiveness of South Africa's high-impact industries through research, technology development and localisation in a collaborative manner, thereby contributing to the re-industrialisation of the country.

KPI 6: Number of localised technologies

The indicator aims to diffuse technologies commercialised or industrialised from elsewhere in the world that have demonstrated potential to positively affect the competitiveness of industry upon competent adoption by users or is a strong candidate to be an input into innovation or enhancements of other systems for the improvement of industrial activities or the capabilities of the state. A localised technology is a technology that has been invented or commercialised outside of South Africa and has been or will be introduced/adapted in South Africa for commercial or scientific benefit or a technology that has been locally developed as an import replacement.

KPI 7: Number of joint technology development agreements being implemented for industry

This indicator measures the CSIR's technology development collaborations with industry partners with the intention to commercialise and industrialise. A joint technology development initiative with an industry partner under a written agreement, where each party brings the needed capability for the development and/or implementation of the technology.

KPI 8: Number of SMMEs supported

The indicator measures the CSIR's contribution to socioeconomic development and industrialisation through the support of Small, Medium and Micro Enterprises (SMMEs). Support of SMMEs (as described in Schedule 1 of the National Definition of Small Enterprise in South Africa under the National Small Enterprise Act), through the implementation of RD&I and technology interventions that contribute to SMMEs becoming more productive, efficient and sustainable.

SO3: DRIVE SOCIOECONOMIC TRANSFORMATION THROUGH RD&I THAT SUPPORTS THE DEVELOPMENT OF A CAPABLE STATE

This SO emphasises the CSIR's role in supporting the development of a capable state and enabling the government to drive the socioeconomic transformation of South Africa through RD&I.

KPI 9: Number of reports directly contributing to national policy formulation and development

The indicator measures the CSIR's support to the government with evidence-based policy development and decision-making that can benefit from significant science, engineering and innovation input. Evidence-based policy development support is provided to various arms of government.

KPI 10: Number of standards delivered or contributed to in support of the state

The indicator measures the CSIR's support for government policy and regulation through the development of standardised practice guidelines across economic and social sectors. New or updated standards adopted by the state and state-owned enterprises (SOEs) that the CSIR has developed and delivered or to which it contributed (e.g., interoperability standards, accessibility standards, products or infrastructure standards).

KPI 11: Number of projects implemented to increase the capability of the state

This indicator measures the number of projects that the CSIR implements on behalf of the state. The CSIR-facilitated implementation of technologies (CSIR-created or otherwise) that improve the efficiency of government, SOEs and South African Universities.

SO4: BUILD AND TRANSFORM HUMAN CAPITAL AND INFRASTRUCTURE

This SO seeks to build and transform the required Human Capital (HC) and investment in infrastructure to drive industrialisation and the advancement of society.

KPI 12: Total science, engineering and technology staff

The indicator is a measure of the CSIR's capacity to deliver on RD&I projects. The number of CSIR staff qualified in the field of science, engineering and technology (SET).

KPIs 13 and 14: Percentage of South African SET staff who are black and female, respectively

These indicators measure the degree of demographic transformation within the RD&I capacity of the organisation. Percentage of staff who are black (as per B-BBEE Act definition) and percentage of SET staff who are female, respectively.

KPI 15: Percentage of SET staff with a doctoral qualification

The indicator measures the organisation's capacity to conduct and supervise quality research and to innovate. The proportion of SET staff who have doctoral-level qualifications.

KPI 16: Total chief researchers

The indicator is a measure of the quality of SET capacity and its potential influence in the local and international RD&I spaces (capacity to collaborate and share resources). The number of CSIR staff appointed and/or recognised as chief researchers through the formal Career Ladder process.

KPIs 17 and 18: Percentage of chief researchers who are black and female, respectively

These indicators measure the level of demographic transformation at the chief researcher level. The proportion of black (as per B-BBEE Act definition) South African and the proportion of female South African citizens who are chief researchers (as per CSIR's Career Ladder process).

KPI 19: Total principal researchers

The indicator is a measure of the quality of SET capacity and its potential influence in the local and international RD&I spaces (capacity to collaborate and share resources). The number of CSIR staff appointed and/ or recognised as principal researchers through the formal Career Ladder process.

KPIs 20 and 21: Percentage of principal researchers who are black and female, respectively

These indicators measure the level of demographic transformation within the principal researcher level. The proportion of black (as per B-BBEE Act definition) South African and the proportion of female South African citizens who are principal researchers (as per CSIR's Career Ladder process).

KPI 22: Number of staff involved in exchange programmes with industry

The indicator measures the level at which CSIR shares expertise and resources to strengthen collaborations with the industry to achieve organisational growth. The exchange of staff between the CSIR and industry for a period of time to share/gain expertise for the advancement of business growth opportunities and capacity development.

KPI 23: Property, plant and equipment investment (Rm)

This indicator provides a measure of the CSIR's investment in research infrastructure to develop and maintain world-class facilities and equipment to provide the quality of RD&I that is expected of it. Property, plant and equipment (PPE) investment is the amount invested in CSIR and government grant-funded PPE, as well as qualifying leases (as per Accounting Standard on Leases) for a financial year.

SO5: DIVERSIFY INCOME, MAINTAIN FINANCIAL SUSTAINABILITY AND GOOD GOVERNANCE

This SO seeks to improve the CSIR's financial sustainability by diversifying revenue sources and optimising the business model to achieve competitiveness supported by good, efficient and sound governance.

KPI 24: Total operating income (Rm)

The indicator reflects the ability of the CSIR to ensure financial sustainability. Growth in total operating income indicates growth in the outcomes and impact achieved by the CSIR. Total operating income includes revenue declared on research and development (R&D) contracts (contract R&D income), income derived from licences and royalties, Parliamentary Grant (PG) received through the Science Vote, as well as other income.

KPI 25: Net profit (Rm)

Net profit is a key indicator of financial sustainability and the ability of the organisation to manage its expenses according to affordability determined by income levels. Profit for a financial year, is calculated as total operating income, less total operating expenditure (including the performance bonus accrual), plus net finance income.

KPI 26: South African public sector income (% total income)

South African public sector income reflects the degree of government public income in the CSIR. South African public sector income is the total income earned from South African government departments (i.e. national, provincial and local), constitutional entities and public entities (as listed in the schedules to the PFMA). This includes revenue declared on R&D contracts (contract R&D income), directed/ring-fenced PG received through the Science Vote and any other forms of funding received from South African public entities.

KPI 27: South African private sector income (% total income)

South African private sector income reflects the degree of private sector investment in the CSIR. South African private sector income is the total income earned from South African non-public entities – not listed as public entities in the schedules of the PFMA and the Municipal Finance Management Act (MFMA). This includes not-for-profit organisations. Licences, royalties and interest income are not included in the definition of South African private-sector investment.

KPI 28: International contract income (% total Income)

International contract income reflects the global relevance of the CSIR. Growth in international investment is a key indicator of income diversification, as well as the relevance and impact of the CSIR within the global economy. International contract income is the total income earned from foreign customers (i.e. entities incorporated outside the borders of South Africa). This includes revenue declared on R&D contracts and other income received from foreign entities.

KPI 29: Broad-Based Black Economic Empowerment rating

The indicator is a measure of the CSIR's compliance with the Broad-Based Black Economic Empowerment (B-BBEE) Act in its contribution to support socioeconomic transformation in South Africa. A B-BBEE rating is a verification certificate issued by a South African National Accreditation System (SANAS)-approved verification agency that determines the CSIR's contribution to black (as per B-BBEE Act definition) economic empowerment.

KPI 30: Recordable incident rate

The recordable incident rate (RIR) indicates the effectiveness of the health and safety management system within the organisation in a year. The RIR is the number of recordable incidences (or cases) multiplied by 200 000 divided by the number of hours worked. A recordable incident is a work-related injury or illness that results in one or more of the following criteria:

- *Death;*
- *Loss of consciousness;*
- *Restricted work or transfer to another job;*
- *Days away from work; and/or*
- *Medical treatment beyond first aid.*

KPI 31: Audit opinion

The indicator is a measure of the CSIR's accountability and governance. The Auditor-General defines a 'clean audit' as achieving an unqualified audit opinion on the audits of annual financial statements and pre-determined objectives, as well as not having material findings on the audit of compliance with laws and regulations.

The target values for the set of KPIs are given in Table 1.

Table 1: CSIR KPIs for 2025/26

KPI		Actual 2022/23	Actual 2023/24	Target 2024/25	Target 2025/26
SO1:	**Conduct RD&I of transformative technologies and accelerate their diffusion**				
KPI 01:	Publication equivalents	398	390	298	**300**
KPI 02:	New priority patent applications filed	8	5	6	**6**
KPI 03:	New patents granted	19	16	12	**9**
KPI 04:	New technology demonstrators	62	77	49	**58**
KPI 05:	Number of technology licence agreements signed	10	13	12	**14**
SO2:	**Improve the competitiveness of high-impact industries to support South Africa's re-industrialisation by collaboratively developing, localising and implementing technology**				
KPI 06:	Number of localised technologies	16	28	13	**10**
KPI 07:	Number of joint technology development agreements being implemented for industry	37	42	27	**33**
KPI 08:	Number of SMMEs supported	116	179	97	**115**
SO3:	**Drive the socioeconomic transformation through RD&I, which supports the development of a capable state**				
KPI 09:	Number of reports contributing to national policy development	14	27	14	**17**
KPI 10:	Number of standards delivered or contributed to support the state	14	21	9	**9**
KPI 11:	Number of projects implemented to increase the capability of the state	130	184	79	**117**
SO4:	**Build and transform HC and infrastructure**				
KPI 12:	Total SET staff	1 555	1605	1642	**1642**
KPI 13:	Percentage of SET staff who are black	70%	72%	69%	**72%**

KPI		Actual 2022/23	Actual 2023/24	Target 2024/25	Target 2025/26
KPI 14:	Percentage of SET staff who are female	39%	39%	38%	**40%**
KPI 15:	Percentage of SET staff with PhDs	20%	19%	19%	**19%**
KPI 16:	Total chief researchers	15	16	18	**20**
KPI 17:	Percentage of chief researchers who are black	27%	25%	28%	**30%**
KPI 18:	Percentage of chief researchers who are female	20%	19%	28%	**20%**
KPI 19:	Total principal researchers	195	195	195	**195**
KPI 20:	Percentage of principal researchers who are black	38%	41%	37%	**40%**
KPI 21:	Percentage of principal researchers who are female	21%	22%	24%	**23%**
KPI 22:	Number of staff involved in exchange programmes with industry	42	47	32	**31**
KPI 23:	PPE investment (Rm)	161.3	263	160	**165**
SO5:	**Diversify income, maintain financial sustainability and good governance**				
KPI 24:	Total income (Rm)	2 861	3179	3121	**3207**
KPI 25:	Net profit (Rm)	43.57	36.47	(67.6)	**(30.8)**
KPI 26:	South African public sector income (% total income)	56%	59%	58%	**59%**
KPI 27:	South African private sector income (% total income)	9%	8%	8%	**8%**
KPI 28:	International contract income (% total income)	9%	10%	11%	**11%**
KPI 29:	B-BBEE rating	1	1	1	**1**
KPI 30:	Recordable incident rate	0	0.09	≤0.4	**≤0.3**
KPI 31:	Audit opinion	Unqualified audit opinion	Unqualified audit opinion	Unqualified audit opinion	**Unqualified audit opinion**

REPORTING

- The Accounting Authority will report on the achievement of its KPIs quarterly, based on PFMA requirements.
- A detailed KPI report approved by the Accounting Authority will be submitted to the Executive Authority annually on or before 31 July of each year, in respect of the immediately preceding financial year. The format of such reporting will be based on the CSIR's KPIs linked to the categories of the Balanced Scorecard Framework.
- The Accounting Authority will meet all the external audit requirements, the results of which will be made available to the Executive Authority, the external auditor of the CSIR, being the Auditor-General, who is responsible for independently auditing and reporting on the financial statements of the CSIR.

EXTRAORDINARY REPORTING

The Accounting Authority will, at its discretion, report to the Executive Authority on matters of strategic importance and/or operational issues that fall outside the agreed framework of this Shareholder's Compact and the PFMA, as agreed to from time to time during its Board meetings.

SUPPORTING DOCUMENTATION

Supporting documentation to this Shareholder's Compact is to be found in the following documents attached hereto:

- CSIR Strategic Plan for 2025/26 as embodied in Annexure A;
- CSIR Annual Plan for 2025/26 as embodied in Annexure B;
- Risk Management Strategy (Plan) as embodied in Annexure D;
- FPP as embodied in Annexure E;
- Materiality Framework as embodied in Annexure F;
- Financial Plan as embodied in Annexure G.

PENALTIES AND REWARDS

The Accounting Authority, in terms of the provisions of section 12 of the Scientific Research Council Act, shall determine the remuneration payable to employees of the CSIR and, in addition, approve the payment of allowances, subsidies and benefits, including performance bonuses.

GOVERNING LAW AND DISPUTE RESOLUTION

This Shareholder's Compact shall be governed by and construed in accordance with the laws of the Republic of South Africa.

In the event of any dispute arising from this Shareholder's Compact, the Parties shall make every effort to settle such dispute amicably.

Should the dispute, despite such mediation, remain unresolved for a further period of 30 days after being so referred, either Party may declare such dispute a formal intergovernmental dispute by notifying the other Party of such declaration in writing. In which event, the Parties will follow the procedure as outlined in section 42 of the Intergovernmental Relations Framework Act, 2005 (Act 13 of 2005).

Should the dispute remain unresolved for a period of 30 days, the said dispute or difference shall be adjudicated upon by a competent third party agreed upon by the Parties, unless otherwise agreed between the Parties by means of arbitration, mediation, or other agreement.

Should the Parties be unable to agree upon a competent third party, as contemplated in clause 15.2, the dispute will be adjudicated by a competent court with jurisdiction to hear the matter.

NOTICES

1. The Parties choose as their *domicilium* addresses for purposes of this Shareholder's Compact the following physical addresses:

   The Accounting Authority: in the care of the Office of the Chief Executive Officer, CSIR, Building 3, CSIR Campus, Meiring Naudé Road, Brummeria, Pretoria, 0184

   The Executive Authority: Building 53, CSIR Campus, Meiring Naudé Road, Brummeria, Pretoria, 0184

2. Each Party shall be entitled, from time to time, by written notice to the other, to vary its domicilium to any other address within the Republic of South Africa, which is not a post office box or poste restante.
3. Any notice given by one Party to the other ('the addressee') which:
    - is delivered by hand during the normal business hours of the addressee at the addressee's domicilium for the time being shall be presumed, until the contrary is proved, to have been received by the addressee at the time of delivery;
    - is posted by pre-paid registered post from an address within the Republic of South Africa to the addressee at the addressee's domicilium for the time being shall be presumed, until the contrary is proved, to have been received by the addressee on the fourth day after the date of posting; and/or
    - is transmitted by telefax or e-mail shall be deemed (in the absence of proof to the contrary) to have been received within one hour of transmission, where it is transmitted during normal business hours of the receiving instrument, and within two hours of the commencement of the following business day where it is transmitted outside those business hours.

WHOLE AGREEMENT

This document, together with the annexures thereto, constitutes the whole of the agreement between the Parties. No instructions, agreements, representations or warranties between the Parties, other than those set out herein, are binding on the Parties.

All undertakings and annexures to this Shareholder's Compact are declared active on the effective date.

VARIATIONS

No variation or modification of any provision of this Shareholder's Compact or consent to deviate therefrom or waiver in terms thereof shall be valid unless such variation or modification or waiver has been reduced to writing and signed by both Parties, and such variation, modification, consent or waiver shall be valid only for a specific case and only for the purpose and extent to which it was made or given.

AMENDMENTS TO THE SHAREHOLDER'S COMPACT

Should either Party wish to make any amendment or alteration to the Shareholder's Compact, that Party shall prepare a change order and present it to the other Party, which shall specify the following:

- The date of the change order;
- The description of the proposed amendment or alteration;
- Previous unspecified ad hoc work to be undertaken, if applicable;
- The reason for making the proposed amendment or alteration;
- When the Party requires the change to be implemented;
- The resources available; and
- The continued balance of the Parties' obligations under this Shareholder's Compact.

The other Party shall be given an opportunity to consider such change order and make a decision on whether it is prepared to accept such change or not; and

No change order shall be of any force and effect until it is approved by duly authorised representatives of each of the Parties.

UNDERTAKING BY THE CHAIRPERSON OF THE CSIR BOARD

The Chairperson of the CSIR Board undertakes to represent the Accounting Authority in carrying out the terms of this Shareholder's Compact and in cascading the spirit of the agreement through the ranks of the CSIR.

UNDERTAKING BY THE MINISTER OF SCIENCE, TECHNOLOGY AND INNOVATION

The Minister of Science, Technology and Innovation, Prof. Blade Nzimande, approves of this approach and looks forward to the successful implementation of the undertakings embodied in this Shareholder's Compact and its annexures. The Minister accepts that, although the details of this Shareholder's Compact may change due to variations and changes in the market and society, the spirit thereof will remain unchanged.

THE CSIR SHAREHOLDER'S COMPACT

Agreed to and signed in PRETORIA on 25 February 2025

Vuyani Jarana

On behalf of the Accounting Authority

Agreed to and signed in PRETORIA on 27/02/ 2025

Prof. Blade Nzimande

The Executive Authority

A STRATEGIC PLAN 2025/26 – 2029/30

A1 OVERVIEW AND BACKGROUND

A.1.1 CSIR MANDATE

The CSIR was established on 5 October 1945 by an Act of Parliament. The Act under which the CSIR now operates, the Scientific Research Council Act, 1988 (Act 46 of 1988) as amended by the Scientific Research Council Amendment Act, 1990 (Act 71 of 1990), the General Law Amendment Act, 1996 (Act 49 of 1996), the Measurement Units and Measurement Standards Act, 2006 (Act 18 of 2006), the Science and Technology Laws Amendment Act, 2011 (Act 16 of 2011), the Science and Technology Laws Amendment Act, 2014 (Act 7 of 2014) and Science and Technology Laws Amendment Act, 2020 (Act 9 of 2020) stipulates the following mandate:

CSIR MANDATE

"The objects of the CSIR are, through directed and particularly multi-disciplinary research and technological innovation, to foster, in the national interest and in fields which in its opinion should receive preference, industrial and scientific development, either by itself or in co-operation with principals from the private or public sectors, and thereby to contribute to the improvement of the quality of life of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act".

Scientific Research Council Act, 1988 (Act 46 of 1988, as amended

Specifically, section 4(a)(i) of the Act dictates that the CSIR supports better utilisation of the resources of the Republic. This is achieved through the improvement of the productive capacity of its population, improvement of technical processes and methods to improve industrial production, the promotion and expansion of existing, as well as the establishment of new industries, standardisation in industry and commerce, and training of the national workforce.

A.1.2 VISION AND MISSION

VISION
We are accelerators of socioeconomic prosperity in South Africa through leading innovation.

MISSION
Collaboratively innovate and localise technologies, while providing knowledge solutions for the inclusive and sustainable advancement of industry and society.

A.1.3 CSIR VALUES

EXCELLENCE

We **strive for excellence** and quality in everything that we do. We **hold each other accountable to the highest standards** and **invest in continuous development** of our people, processes and ways of doing business.

PEOPLE-CENTRED

Our business is about touching lives. **We respect diversity and conduct** ourselves in a manner that **upholds the dignity of every person**. We **treat all our stakeholders the way we like to be treated**.

INTEGRITY

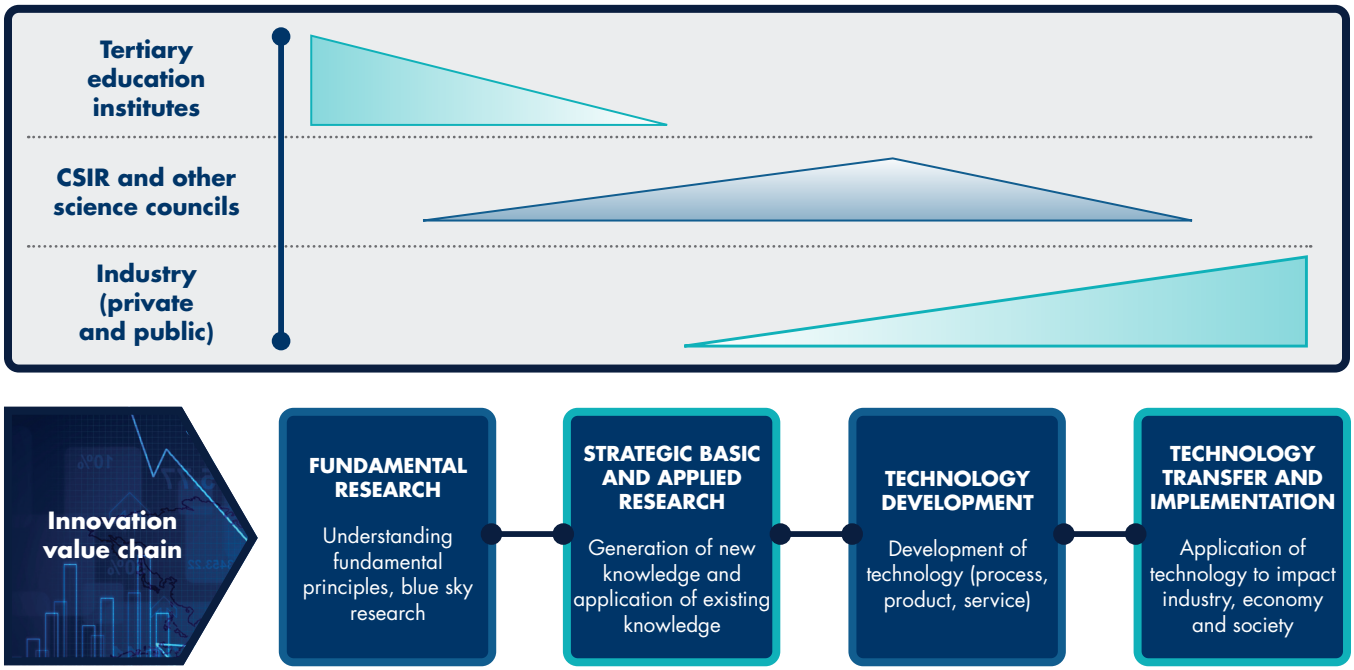
We **act with integrity**. We **respect the trust that our colleagues and stakeholders place in us**, and commit to **ethical decision-making, delivery and governance**.

COLLABORATION

We are keen to **learn from one another** and **collaborate across the organisation** and with **external partners** to ensure that our work has the best chance of **innovating a better future for South Africans**.

A.1.4 CSIR ROLE IN THE INNOVATION VALUE CHAIN

The Council for Scientific and Industrial Research (CSIR) plays a pivotal role in South Africa's National System of Innovation (NSI) by bridging the gap between fundamental research and practical application. The CSIR conducts strategic basic and applied research, focusing on the development of transformative technologies that address national priorities. By collaborating with tertiary education institutes, other science councils and industry partners, the CSIR ensures that new knowledge and technological advancements are effectively translated into practical solutions that benefit the economy and society. This collaborative approach enhances the country's innovation capacity and supports the development of a capable state. Ideally, the mandate of the CSIR should be enhanced so that it is the designated entity to support the science, technology and innovation requirements for all of government. In addition, given the nature and depth of the capabilities at the CSIR, it should be mandated and enabled to conduct translational research for all intellectual property emanating from publicly-funded research and development.



Moreover, the CSIR is instrumental in technology transfer and implementation, ensuring that innovations are commercialised and adopted by industry. Through initiatives like joint technology development, licencing and custom solution development, the CSIR fosters industrial growth and competitiveness. The CSIR recently launched CSIR C-Cubed (C^3), a standalone enterprise dedicated to driving the commercialisation of CSIR's technology by providing financial resources, technical support and an incubator environment for start-ups. This initiative aims to foster collaboration with investors, entrepreneurs and innovators, playing a pivotal role in catalysing the re-industrialisation of South Africa through new technology-based enterprises. The organisation also supports human capital development by partnering with higher education institutions and government departments to co-invest in skills development. The CSIR's involvement spans the entire innovation value chain, from fundamental research to technology development and commercialisation, ensuring that each stage contributes to socioeconomic transformation and the sustainability of South Africa's industrial and scientific advancements.

A2 CONTEXT ANALYSIS

The CSIR Strategy for 2025/26 – 2029/30 is shaped by key global and regional trends, national imperatives and priorities.

A.2.1 POLITICAL CONTEXT

The global political context is characterised by significant geopolitical tensions and increasing geoeconomic fragmentation. These factors pose substantial risks to global trade, investment, and economic stability. Addressing these challenges requires coordinated policy efforts, structural reforms, and enhanced international cooperation to ensure sustainable and inclusive global growth[1].

The global political landscape is currently marked by significant geopolitical tensions and geoeconomic fragmentation that have far-reaching implications for the global economy. One of the most critical issues is the ongoing war in Ukraine, which has disrupted global trade and energy markets. This conflict has led to a realignment of trade flows, with countries forming new geopolitical blocs. Countries are forming alliances based on political alignments, such as the bloc including Australia, Canada, the European Union, New Zealand and the United States (US), versus the bloc comprising China, Russia and their allies. Trade growth between these blocs has slowed significantly, especially in strategic sectors like chemicals and machinery. This fragmentation limits international flows of goods, services, capital and workers, reducing the scope for efficiency gains from specialisation, economies of scale and competition[2].

Another area of concern is the conflict in Gaza and Israel, which has the potential to escalate further and affect regional stability. This conflict could lead to spikes in food, energy and transportation costs, complicating the global economic recovery. Additionally, continued geopolitical tensions in the Middle East, including attacks in the Red Sea, pose risks to global oil supply and prices. These tensions can lead to increased volatility in commodity prices and disrupt global trade routes, further exacerbating economic uncertainties[3].

Geopolitical tensions and conflicts in Africa are driven by a combination of internal factors, including political instability and regional conflicts. Countries like Sudan and South Sudan face severe economic and social impacts due to ongoing conflicts, which lead to humanitarian crises, displacement and loss of life. In the Sahel region, nations such as Mali, Burkina Faso and Niger are plagued by militant groups that disrupt local economies and create significant security challenges. Similarly, in Central Africa, the Democratic Republic of Congo and the Central African Republic experience widespread violence and instability due to armed groups vying for control of mineral-rich areas. These conflicts strain public finances, divert resources from development projects to defence spending, and undermine investor confidence, leading to reduced economic growth. Additionally, political instability from unconstitutional changes of government, as seen in recent coups in Burkina Faso, Guinea and Mali, exacerbates the situation, resulting in sanctions and further economic disruptions. Addressing these challenges requires comprehensive governance reforms, economic diversification and enhanced regional cooperation to build resilience and promote sustainable development[4].

1 International Monetary Fund (2024). World Economic Outlook: April 2024, p. xiv. Accessed via https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024
2 ibid
3 ibid
4 African Development Bank Group (2024). African Economic Outlook 2024, p. 1. Accessed via www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_chapter_1.pdf

South Africa is considered a non-aligned country in the context of the geopolitical blocs discussed in the IMF's "World Economic Outlook 2024." This means that South Africa does not strictly align itself with either the Western bloc (which includes countries like Australia, Canada, the European Union, New Zealand and the United States) or the Eastern bloc (which includes China, Russia and their allies). Instead, South Africa maintains a more neutral stance, engaging in trade and political relationships with both blocs[5].

South Africa's non-aligned status allows it to navigate a complex geopolitical landscape, maintaining relationships with both Western and Eastern blocs. This strategic positioning can offer economic opportunities and challenges, as the country can benefit from diverse trade partnerships but also faces the complexities of balancing these relationships amid global tensions[6].

For the CSIR, this presents an opportunity to establish and maintain strategic scientific partnerships with organisations in both the Western and Eastern blocs. This will lead to sustained international revenue-generating activities, diversifying income streams and ensuring financial sustainability. Since trade growth between these blocs has slowed significantly in strategic sectors such as chemicals and machinery, the organisation's strategy will highlight several research and development initiatives that address challenges in the chemicals and industrial machinery sectors.

A.2.2 ECONOMIC CONTEXT

Economic risks associated with these geopolitical tensions and geoeconomic fragmentation include the potential for new supply shocks, raising interest rate expectations and causing asset price volatility. Persistent inflation and financial stress could result from slower-than-expected declines in core inflation and high household debt levels. On the upside, there is potential for short-term fiscal boosts in the context of upcoming elections in many countries and faster-than-expected improvements in supply-side conditions, which could allow for earlier monetary policy easing.

Global prospects for medium-term economic growth appear bleak. Historically weak, these projections have been shaped by rising geopolitical fragmentation, increased restrictive trade and industrial policies affecting global trade linkages, and the weakening of multilateral frameworks and global cooperation. Acknowledging this critical state of global affairs, Pierre-Olivier Gourinchas, Economic Counsellor and Director of Research at the International Monetary Fund (IMF), cautiously remarked in the April 2024 World Economic Outlook (WEO) that:

> *"Much hope rests on artificial intelligence (AI) delivering strong productivity gains in the medium term. It may do so, but the potential for serious disruptions in labour and financial markets is high. Harnessing the potential of AI for all will require that countries improve their digital infrastructure, invest in human capital and coordinate on global rules of the road."*[7]

The projections, along with the current global environment in which the organisation operates, are shaped by the following complex factors:

Global Economic Outlook

There are ongoing challenges in the global arena which include post-pandemic supply chain disruptions, the Russian-Ukrainian conflict, which has placed significant pressure on global energy and food supplies and prices, the evolving conflict in the Middle East and the surge in inflation. Although inflation is decreasing faster than projected, real interest rates have risen as central banks attempt to restore price stability, raising concerns about debt dynamics in emerging markets.

5 International Monetary Fund (2024). World Economic Outlook: April 2024, p. xiv. Accessed via https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024

6 International Monetary Fund (2024). World Economic Outlook: April 2024, p. xiv. Accessed via https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024

7 ibid

The global recovery remains uneven, with different regions performing at varying levels. The IMF's WEO July 2024[8] notes that the growth projections outlined in their April 2024 report remain unchanged: the world economy is expected to grow by 3.2% in 2024 and 3.3% in 2025. Advanced economies are projected to see slight growth acceleration, from 1.6% in 2023 to 1.7% in 2024 and 1.8% in 2025. However, these increases will be offset by a slowdown in both emerging market and developing economies, where growth is expected to slow from 4.3% in 2023 to 4.2% in 2024, and remain unchanged in 2025. According to the Organisation for Economic Co-operation and Development (OECD), it is important to note that "…divergence across economies is expected to persist in the near term but fade as the recovery in Europe becomes more firmly based, and growth moderates in the US, India and several other emerging market economies."[9]

Africa's Economic Outlook

The economic outlook for the African continent is optimistic, with the region expected to grow by 3.7% in 2024 and reach 4.3% by 2025, despite ongoing challenges from global factors. East Africa is projected to lead this growth, with a substantial increase of 3.4%, followed by Southern and West Africa, each rising by 0.6%. The African Development Bank notes, "This is remarkable, and as the pace of growth accelerates, Africa will retain its position as the second-fastest growing region after developing Asia, with a projected average real gross domestic product (GDP) growth higher than the global average of 3.2% in 2024."[10]

It is important to highlight that, similar to global economic trends, there remains a divergence in growth rates across the continent, with varying increases and contractions across its five (5) geographic regions and economic groupings. The economic outlook by grouping is as follows:

- ***Non-resource-intensive economies:*** Growth is expected to increase from 4.8% in 2023 to 5.3% in 2024 and 5.6% in 2025, supported by public investments in major growth sectors and infrastructure improvements like electricity, transport and logistics.
- ***Tourism-dependent economies:*** Growth is projected to decelerate from 5.8% in 2023 to 4.7% in 2024 and further to 3.9% in 2025, primarily due to the stabilisation of tourism numbers, with slower economic growth in Mauritius and Seychelles driving the trend.
- ***Oil-exporting economies:*** Growth is anticipated to decline slightly from 3.7% in 2023 to 3.5% in 2024 before recovering to 4% in 2025. The slowdown is attributed to reduced oil production targets set by the Organisation of the Petroleum Exporting Countries (OPEC), issues with South Sudan's pipeline and uncertainties around Angola's oil exports post-OPEC.
- ***Other (non-oil) resource-intensive economies:*** Growth is expected to rise sharply from 0.3% in 2023 to 2.7% in 2024, consolidating at 3.3% in 2025. This rebound is driven by increased demand from China for metals and minerals, particularly in smart grids and construction.

South Africa's Economic Outlook

The OECD is more optimistic about South Africa's growth prospects, projecting real GDP to increase by 1% in 2024 and 1.4% in 2025, compared to the IMF's more modest forecasts of 0.9% and 1.2% for the same period. Although this growth remains lower than global and continental averages, it is expected to gradually improve over the next three (3) years, with the National Treasury forecasting an average of 1.6%[11].

8 IMF (2024). World Economic Outlook: July 2024, p. 2. Accessed via https://www.imf.org/en/Publications/WEO/Issues/2024/07/16/world-economic-outlook-update-july-2024

9 Organisation for Economic Co-operation and Development (OECD) (2024), OECD Economic Outlook, Volume 2024 Issue 1: An unfolding recovery, p.10. Accessed via https://www.oecd.org/en/publications/oecd-economic-outlook/volume-2024/issue-1_69a0c310-en/full-report.html.

10 African Development Bank Group (2024). African Economic Outlook 2024. Accessed via www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_chapter_1.pdf

11 National Treasury (2024). 2024 Budget Review: Economic Outlook. Accessed via www.treasury.gov.za/documents/National%20Budget/2024/review/Chapter%202.pdf

South Africa's growth is supported by reduced power outages and fewer bottlenecks in rail freight and ports stemming from comprehensive structural reforms. The energy reforms, including increased generation capacity, are crucial to revitalising key sectors such as manufacturing, mining, agriculture, forestry, fishing, transport, storage and communication. Efforts to improve water and telecommunications infrastructure are also underway. However, the National Treasury has acknowledged that full economic recovery will take time[12]. Long-term growth depends on improvements in energy, freight rail and ports, as well as reducing structural barriers to economic activity. The government aims to promote macroeconomic stability, manage risks of imbalances and support savings and investment through structural reforms in key sectors such as freight logistics, ports, energy, water and telecommunications. These reforms are expected to boost efficiency, attract investment and improve services for communities[13]. CSIR's capabilities, research infrastructure and the calibre of its scientists are already geared towards supporting these areas of the economy with technology solutions and opportunities for localisation of various technical industrial processes and products in freight logistics, ports, energy, water and telecommunications. The CSIR requires additional resources to provide these solutions at pace and scale for social and industrial impact.

Monetary Policy and Inflation

Central banks have been decisive in their efforts to curb inflation, but services inflation is slowing progress on disinflation. This, in turn, puts pressure on efforts to normalise monetary policy. The OECD is, however, optimistic about its projections for annual consumer price inflation in G20 countries, expecting a decline from 5.9% in 2024 to 3.6% in 2025, stating that "… by the end of 2025, inflation is projected to be back on target in most major economies." The IMF has noted that advanced economies are likely to return to their inflation targets sooner than emerging market and developing economies. Monetary policy is expected to remain restrictive, with gradual declines in real interest rates. The continued negative effects across global markets are impacting housing, employment and trade, placing further financial pressure on households already struggling with high debt.

The current elevated levels of inflation across the African continent are driven by several factors, including higher local food prices due to drought-related supply shortages, excess liquidity from pandemic-era fiscal and monetary support and the effects of currency depreciation against a strong US dollar, particularly as countries service dollar-denominated debt, compounded by high US interest rates. Rising food prices are contributing to food insecurity in the region, and if inflation remains elevated, it could further strain economies by reducing real wages and keeping interest rates high. The African Development Bank cautions that "Higher commodity prices could ignite a new wave of inflation, upend the decline in poverty, and delay the process of monetary policy easing on the continent."[14]

South Africa's fiscal strategy aims to lower the risk premium, bolster investor confidence and modestly increase investment and demand for domestic assets, which will also support the rand. Declining energy and food prices are expected to help reduce inflation, while rising real wages, employment and purchasing power will gradually stimulate consumption growth, offering relief to low-income households. If inflation continues to decrease, monetary policy could be gradually eased in 2024 and 2025, further supporting economic growth. Despite planned fiscal consolidation, public debt is expected to rise, partly due to debt relief for Eskom, which continues to strain public finances and hinder growth-enhancing measures. According to The Presidency, "Debt servicing is already the third most expensive line item in the national budget, crowding out crucial social and other spending"[15]. This means that the fiscus is heavily constrained, and over recent years, the science council has received a Parliamentary Grant (PG) that is not on par with inflation. The reduction of PG in real terms over

12 National Treasury (2024). 2024 Budget Review. Accessed via https://www.treasury.gov.za/documents/National%20Budget/2024/review/Chapter%202.pdf

13 National Treasury (2024). 2024 Budget Review: Economic Outlook. Accessed via www.treasury.gov.za/documents/National%20Budget/2024/review/Chapter%202.pdf

14 African Development Bank Group (2024). African Economic Outlook. Accessed via https://www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_chapter_1.pdf

15 The Presidency (2024). Annual Performance Plan (APP) 2024/25, p. 25. Accessed via www.parliament.gov.za/storage/app/media/Docs/ann_pln/c115a8f0-ffa1-438d-a64f-f645e6d9b130.pdf

the years, compounded by severe budget cuts, compromises the ability of the organisation to deliver on its mandate. The core PG to the CSIR should be approximately R957 million if it grew with inflation from the 2018/19 financial year level. However, the 2023/24 core baseline allocation was below that of 2018/19.

Trade relations

The ongoing trade tensions between the US and China have further weakened trade links between the two countries since 2017. This has led to a reallocation of trade flows, with the US sourcing more from countries like Mexico and Vietnam. Geoeconomic fragmentation is expected to lead to increased macroeconomic volatility and reduced cross-country diversification, posing substantial risks to global trade, investment and economic stability.

The African Continental Free Trade Area (AfCFTA) is crucial in providing opportunities for trade diversification, the development of regional value chains, particularly in key agricultural sectors and the promotion of economic integration by reducing trade barriers and improving infrastructure. These efforts will accelerate industrialisation and promote sustainable growth across the continent. The African Export-Import Bank reports that while Africa's trade contracted by 6.3% in 2023, intra-African trade showed resilience, expanding by 3.2% during the same period. They project that "…intra-African trade across the Continental sub-regions to expand between 2024 and 2026, led by Southern African economies leading intra-regional trading."[16]

South Africa, as one of the G20 emerging markets, remains integrated into the global economy through trade and participation in global value chains. However, the country faces challenges from weak domestic demand and sluggish export demand in key global markets. This includes reduced commodity demand from China and potential obstacles for manufactured exports in traditional markets such as the European Union and the US. To stimulate trade and investment, South Africa will continue leveraging regional partnerships and trade agreements, notably the African Growth and Opportunity Act (AGOA) and the AfCFTA. The continental trade agreements open an opportunity for the CSIR to strengthen research and innovation collaborations and strategic partnerships to address developmental challenges that pertain to Africa and, importantly, support our partners to enhance the industrialisation of the continent through such alliances.

The CSIR's Africa Strategy is well-aligned with major continental initiatives such as the African Union's Agenda 2063 and the Science, Technology and Innovation Strategy for Africa (STISA-2024). This alignment ensures that CSIR's efforts contribute to broader goals of sustainable development and technological progress across the continent. The CSIR has a strong track record of impactful initiatives, including the Science Diplomacy Capital for Africa, AUDA-NEPAD Centre of Excellence in Science, Technology and Innovation, SADC Groundwater Management Institute, Southern African Network for Biosciences (SANBio), African Laser Centre, Marine and Coastal Operations Southern Africa (MarCOSIO) and Biomanufacturing Skills Development, which is supported by the Bill and Melinda Gates Foundation. These initiatives highlight the CSIR's commitment to advancing scientific research and innovation in Africa.

16 African Export-Import Bank (2024). African Trade and Economic Outlook 2024, p. 5. Accessed via https://media.afreximbank.com/afrexim/Afreximbank-African-Trade-and-Economic-Outlook-2024_compressed-1.pdf

A.2.3 SOCIAL CONTEXT

The social context outlined in the IMF's "World Economic Outlook 2024" highlights several critical issues impacting global living standards, poverty reduction, and social stability. Persistent low-growth prospects threaten efforts to improve living standards and reduce poverty, particularly in developing and emerging market economies. High interest rates and low growth can exacerbate social tensions, leading to increased inequality and social unrest as governments may implement austerity measures. Demographic pressures and declining labour force participation, coupled with shifts in labour market dynamics due to the Covid-19 pandemic, pose significant challenges to productivity and economic resilience. Technological advances, while offering potential productivity gains, also risk job displacement, particularly for low-skilled workers. Climate change further threatens social stability, especially in vulnerable regions, necessitating investments in climate-resilient infrastructure and sustainable practices. To address these challenges, the IMF recommends structural reforms to enhance productivity, gradual fiscal consolidation to ensure debt sustainability, strengthening social safety nets, investing in climate adaptation, and supporting education and vocational training to help workers transition to new types of employment. Coordinated policy efforts and enhanced international cooperation are essential to ensure sustainable and inclusive growth[17].

The WEF Global Risks Report 2024 identifies several key societal risks that are expected to have significant impacts over the short and long term. Among these, societal polarisation stands out as a major concern, driven by political and economic factors that erode trust and shared values. This risk is closely linked with economic downturns and misinformation, making it one of the most central risks in the global network. Other significant societal risks include the erosion of human rights and civic freedoms, which threaten privacy, freedom of speech and expression. Inequality or lack of economic opportunity is another persistent risk, exacerbated by economic downturns and unemployment, leading to barriers to realising economic potential and security. Additionally, involuntary migration, driven by discrimination, lack of opportunities, natural disasters and conflicts, poses a significant challenge, interconnected with environmental and economic risks[18].

Infectious diseases remain a critical societal risk, with the potential for widespread loss of life and economic disruption due to the spread of viruses, bacteria, and other pathogens. Insufficient public infrastructure and services, including inadequate social security, housing, education, healthcare and transportation, further exacerbate societal vulnerabilities. Unemployment, driven by structural changes in the labour market, automation, and the green transition, poses a significant threat to social stability and mobility. Chronic health conditions linked to ageing, consumption habits and climate change also present long-term challenges. Addressing these societal risks requires a multifaceted approach, including enhancing public awareness, improving economic opportunities, ensuring equitable access to services and fostering social cohesion through effective governance and international cooperation[19].

The social context in the African continent is shaped by a diverse range of factors, including demographic trends, urbanisation, education, health and social inequalities. Africa is home to a rapidly growing population, with a significant proportion of young people. This demographic trend presents both opportunities and challenges. On one hand, the youthful population can drive economic growth and innovation if adequately educated and employed. On the other hand, it also puts pressure on education systems, healthcare and job markets. Urbanisation is another critical factor, with many African cities experiencing rapid growth. This urban expansion can lead to improved access to services and economic opportunities but also creates challenges such as housing shortages, inadequate infrastructure and increased pollution[20].

17 International Monetary Fund (2024). World Economic Outlook: April 2024. Accessed via https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024
18 WEF (2024). Global Risks Report 2024, Accessed via Preface - Global Risks Report 2024 | World Economic Forum
19 ibid
20 African Development Bank Group (2024). African Economic Outlook. Accessed via https://www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_chapter_1.pdf

Education and health are pivotal in shaping the social landscape. While there have been improvements in access to education, quality remains a concern, with many children not achieving basic literacy and numeracy skills. Health systems across the continent face significant challenges, including high rates of infectious diseases, maternal and child mortality and emerging non-communicable diseases. Social inequalities, including gender disparities, also play a crucial role in the social context. Women and girls often face barriers to education, employment, and healthcare, which limits their potential and contributes to broader social and economic inequalities. Addressing these issues requires comprehensive policies that promote inclusive growth, improve access to quality education and healthcare, and reduce social inequalities[21].

The 2024 Budget Review from South Africa's National Treasury highlights the country's economic outlook and key strategies for growth, emphasising the interconnectedness of economic and social factors. The unemployment rate moderated to 31.9% in the third quarter of 2023, but joblessness remains high, necessitating faster economic growth for significant job creation. Household consumption is under pressure from high living costs and weak consumer confidence, with inflation projected to moderate from 6% in 2023 to 4.9% in 2024. The social context is also addressed through efforts to improve water supply, digital infrastructure, and disaster response, which are crucial for both urban and rural communities. Sustained economic growth is essential to address high levels of unemployment and poverty, with the government's focus on creating a stable macroeconomic environment, implementing structural reforms, and enhancing state capacity to support social and economic development. Overall, the review underscores the need for large-scale private investment to accelerate GDP growth and improve living standards in South Africa[22].

The CSIR Mandate is to conduct scientific, technological and industrial research to better the lives of people in the Republic and beyond. The issue of unemployment is very much linked to the inability to adequately grow economic productivity. There is a missed opportunity because South Africa has a large percentage of young people with the energy to create and innovate. The CSIR provides technology, process and product development support to small, medium and micro enterprises (SMME) that are typically owned by Women, Youth and People with Disabilities to boost economic activity and generate employment.

In terms of infectious diseases, the CSIR's clusters are involved in various health-related technology developments including point-of-care diagnostics, tools for pharmacovigilance and localisation of vaccine development. The CSIR has developed health registration systems for the Department of Health to improve efficiencies at public healthcare institutions. The capability to develop these tools is available at the CSIR. There is an opportunity to roll out these tools across provinces and for the CSIR to develop similar systems elsewhere in the continent.

21 African Development Bank Group (2024). African Economic Outlook. Accessed via https://www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_chapter_1.pdf

22 National Treasury (2024). 2024 Budget Review: Economic Outlook. Accessed via www.treasury.gov.za/documents/National%20Budget/2024/review/Chapter%202.pdf

A.2.4 TECHNOLOGICAL CONTEXT

Driven by concerning growth projections, the OECD underscores the urgency of bolstering global trade and productivity, with AI playing a pivotal role in achieving these gains. Along with the IMF, they highlight the transformative potential of AI and other emerging technologies to drive productivity improvements. Key measures include enhancing workforce skills, removing barriers to business innovation and expansion, and adopting sound science and technology policies to foster innovation. These steps are crucial for countries to fully leverage globally developed technologies.

General-purpose technologies like AI hold immense potential to significantly enhance capital productivity, thereby reshaping economic landscapes. However, with these changes, one needs to remain cognisant that AI exposure varies widely across different country groupings, with approximately 60% of jobs in advanced economies affected by AI, compared to 40% in emerging markets and just 26% in developing countries. In advanced economies, AI is anticipated to enhance productivity in about half of these jobs, while the other half may face automation, reducing labour demand and wages and potentially causing job obsolescence. Emerging markets and developing countries are less likely to see immediate disruptions from AI but may also experience fewer advantages due to a lack of infrastructure and skilled workers. This disparity raises concerns that AI could deepen inequality between countries over time. As a result, Clare Lombardelli, the Chief Economist for the OECD, critically notes that "Ensuring the benefits materialise and are broadly shared requires investments in education and training and strong and internationally consistent competition policy"[23].

The Global Risks Report highlighted the growing risk of technological disruptions, with the rapid adoption of advanced technologies exposing more people to potential digital and physical exploitation. Organised crime networks are increasingly using new technologies to diversify their operations, posing significant risks to individuals and businesses. Cybercrime, offering a low-cost, low-risk revenue stream, is becoming more attractive to these networks. Generative AI is making phishing attacks easier to execute, even in minority languages. As cyber defences improve, criminals will likely shift focus to less digitally literate individuals and less secure systems. Cybercrime, already prevalent in Latin America, is expected to spread further across Asia, West, and Southern Africa as internet connectivity and wealth increase[24].

To complement the GRPS data on global risks, the WEF also incorporates insights from their Executive Opinion Survey (EOS), which gathered input from over 11 000 business leaders across 113 economies. The EOS identifies the most severe risks each country faces over the next two (2) years. When combined with the GRPS, this data offers valuable insight into local concerns and priorities and highlights potential "hot spots" where global risks may have regional impacts. In South Africa, the EOS identified the following top five (5) risks with the greatest impact, ranked in order: Energy supply shortage, economic downturn, unemployment, state fragility, and water-supply shortage[25].

23 International Monetary Fund (2024). World Economic Outlook: April 2024. Accessed via https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024
24 WEF (2024). Global Risks Report 2024, Accessed via Preface - Global Risks Report 2024 | World Economic Forum
25 WEF (2024). Global Risks Report 2024, Accessed via Preface - Global Risks Report 2024 | World Economic Forum
26 McKinsey Digital (2024). McKinsey Technology Trends Outlook 2024. Accessed via https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-top-trends-in-tech

Technology trends for 2024

The following are the top 15 technology trends for 2024 identified by McKinsey Digital (Figure A1), a division of McKinsey & Company, alongside a brief description as well as what to expect for the year ahead and beyond[26]:

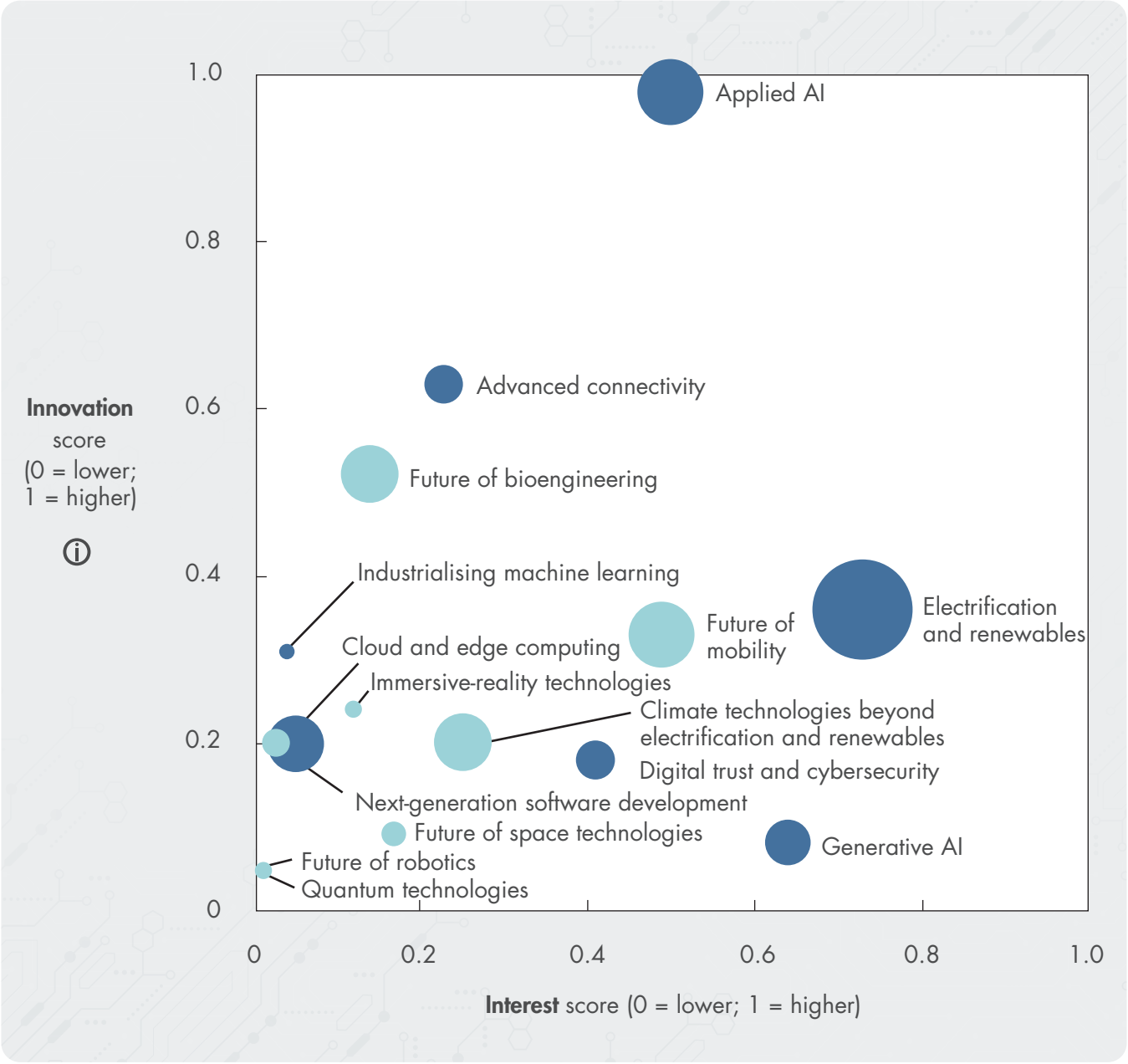


Figure A1: Top 15 technology trends for 2024

- **Generative AI:** AI systems that can create new content such as text, images, and videos. Expect continued rapid advancements, especially in areas like content creation and automation.
- **Applied AI:** The use of AI for specific tasks, such as predictive analytics and automation. This trend will further integrate AI into everyday business operations, driving efficiency and decision-making.
- **Industrialising machine learning:** Focused on scaling machine learning systems for broad enterprise use, this trend will streamline the adoption of AI technologies in business, ensuring consistency and reducing risks.
- **Cloud and edge computing:** The combination of cloud computing and localised edge systems will enable faster data processing and more efficient operations, particularly for the internet of things (IoT) and real-time applications.
- **Advanced connectivity:** 5G and next-generation networks are transforming industries, from manufacturing to healthcare, by enabling faster, more reliable connections.
- **Digital trust and cybersecurity:** As digital threats increase, innovations in cybersecurity and trust-building technologies will be critical to safeguard data and online ecosystems.
- **Electrification and renewables:** With a growing focus on sustainability, investment in clean energy technologies such as solar, wind and electrified transport will continue to rise, driving global decarbonisation.
- **Next-generation software development:** Advances in software development tools and methodologies will improve productivity and enable faster, more efficient creation of complex systems.
- **Climate technologies beyond renewables:** Beyond renewable energy, technologies focusing on carbon capture, water conservation, and sustainable agriculture will be essential in addressing climate change.
- **Future of mobility:** Expect further developments in electric vehicles, autonomous driving and smart infrastructure that will redefine transportation.
- **Future of robotics:** Robotics is evolving with AI integration, allowing robots to perform more complex tasks in industries like healthcare, manufacturing, and logistics.
- **Immersive reality technologies:** Virtual reality (VR) and augmented reality (AR) are expected to mature, offering new ways to interact with digital content, particularly in gaming, education and remote work.
- **Future of bioengineering:** Advances in biotechnology, such as gene editing and synthetic biology, will push boundaries in healthcare, agriculture, and manufacturing.
- **Quantum technologies:** While still in the early stages, quantum computing is set to revolutionise industries by solving problems beyond the capabilities of classical computers.
- **Future of space technologies:** With growing investment in space exploration and satellite technology, expect innovations in communication, defence and resource extraction from space.

These trends reflect the future's direction, where digital transformation, sustainability, and advanced AI will drive innovation across industries.

According to WEF's Global Risk Report, countries need to be cognisant of the following technological disruptions:

- **AI's societal impact and risks:** Advanced AI could exacerbate inequalities by dividing those who can access or develop it from those who cannot. AI integration in decision-making, especially in conflict scenarios, could lead to unintended escalations or empower malicious actors. As AI technology becomes more powerful, it will reshape economies and societies, bringing productivity gains but also risks, such as job displacement, misinformation, bias and potential use in warfare.
- **Regulatory challenges:** The development of AI is outpacing regulation. Governments struggle to keep up with AI's advancements due to the "Black Box Problem" (difficulty in understanding AI) and the "Pacing Problem" (regulation lagging behind innovation). Unregulated AI could threaten political stability, economic markets, and global security.

- **Quantum computing risks:** Quantum computing could disrupt global power structures by breaking cryptography, exposing sensitive data, and threatening infrastructure like banks and power grids. If quantum breakthroughs occur covertly, global security dynamics may be destabilised, posing severe risks.
- **Technological acceleration:** Emerging technologies like AI and quantum computing are expected to experience rapid development over the next decade. The unpredictable nature of these advancements could bring about both benefits and novel risks, such as changes in global security and ethical concerns with human-technology integration.
- **Bioweapons threats:** AI tools could enable the creation of advanced bioweapons, potentially allowing non-state actors to develop and deploy them. This could lead to devastating impacts, including the targeted disabling of military forces or ethnic groups, highlighting the need for stringent regulation of AI technologies in biological research.

The CSIR is actively engaged in generative AI initiatives, including projects like NextGen Natural Language Processing (NLP), which includes developing a voice dubbing interface and hosting advanced NLP models via an Application Programming Interface. Another relevant project focuses on Digital Asset Fraud Detection using blockchain analytics to identify illicit financial transactions, while Trustworthy AI in Credit and Lending Systems aims to integrate explainable AI principles into credit risk assessment to ensure transparency and fairness. These initiatives demonstrate the CSIR's commitment to leveraging generative AI to enhance digital capabilities and address various challenges across different sectors.

Another example of the organisation's technological capabilities that can be used across government and the private sector in the area of digital trust and cybersecurity is the CSIR's Cybersecurity Centre. The centre focuses on enhancing cybersecurity capabilities through several key initiatives. These include Project Insight, which aims to develop a misinformation detection platform and centralised data hub, and Project Honeynet, which enhances the graphical user interface for Honeynet and explores licencing opportunities. The Cybersecurity and Ransomware Lab develops solutions to protect against ransomware, while Project PCAT incorporates General Data Protection Regulation (A comprehensive data protection law that was implemented by the European Union (EU) in May 2018) assessments into a privacy compliance tool. Project OSINT develops tools for open-source intelligence investigations, and Project Certify creates hardware prototypes for certification processes. The centre also works on a decentralised digital identity framework, enhances cybersecurity assessment tools through Project ECSA, and develops a zero-knowledge proof application using biometric data. Additionally, the Cloud Security Readiness Toolkit aims to prepare organisations for cloud security, and the Virtual Security Operations Centre provides consolidated cybersecurity situational awareness. Finally, the centre is developing a public key infrastructure for South Africa to enhance digital security. These initiatives involve collaborations with various stakeholders, including SMMEs, government departments and international partners, to protect digital identities, secure critical infrastructure and support the state's cybersecurity governance and resilience.

The list of technology areas in which the CSIR has capabilities cuts across that list of top technology trends, the two examples above are just a few to illustrate the point. To maintain these capabilities locally and ensure strategic independence, the CSIR requires much more support from the government.

A.2.5 ENVIRONMENTAL CONTEXT

Climate change and environmental challenges

Both the IMF and the OECD emphasise the urgent need to address climate change, mitigate environmental degradation, and prevent climate-related disasters. Significant investments are especially necessary in emerging markets. Key actions include reducing fossil fuel subsidies, increasing green investments and promoting the transfer of low-carbon technologies from advanced to emerging and developing economies to help reduce emissions.

Building on recent agreements at the 2023 Conference of the Parties to the United Nations Framework Convention on Climate Change is crucial to facilitating the transition to green energy. These efforts must be supported by multilateral cooperation, which is essential not only for enabling these initiatives but also for minimising the costs and risks associated with climate change. The OECD also critically noted that "…accelerating decarbonisation requires bold policy measures, such as investing in green and digital infrastructure, enhancing carbon pricing, and promoting technology transfer."[27]

Climate-related events also pose a significant risk to Africa's growth recovery, particularly for vulnerable states transitioning through economic reforms. Countries must prioritise climate adaptation policies to strengthen their resilience to climate-related disasters. The African Development Bank has stressed that African nations are more susceptible to climate shocks such as floods, droughts and storms than other regions despite contributing the least to global climate change. Studies show that climate change inflicts lasting economic damage on African countries, with cumulative GDP losses averaging 4% three (3) years after extreme weather events, compared to just 1% in other regions[28].

South Africa is also grappling with the effects of climate change, which disproportionately impacts poor and rural communities. At COP28, South Africa committed to reducing carbon emissions as part of the global effort to combat climate change. The country's Just Energy Transition (JET) Investment Plan for 2023-2027 outlines its carbon reduction goals and steps to transition away from carbon-intensive energy production while balancing developmental and energy security needs. The Government also plans to establish a Climate Change Response Fund to unite government and the private sector in efforts to build resilience and address climate impacts[29]. The CSIR is part of the conversations in the JET space and is involved in various research projects that support JET (Please see section A.2.12.1).

Moreover, the CSIR has several key initiatives that address environmental sustainability. These include ensuring energy and water security, promoting sustainable human settlements, and implementing green infrastructure and climate change adaptation strategies. The CSIR supports industrial revitalisation through resource efficiency and the transition to a low-carbon, circular economy. Coastal and marine science projects address ecosystem restoration and green port management. Additionally, the CSIR conducts research on green hydrogen development and smart water management. These efforts align with the Sustainable Development Goals (SDGs), specifically 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), 13 (Climate Action), 14 (Life Below Water) and 15 (Life on Land), demonstrating a commitment to sustainable development through innovative research and strategic collaborations.

A.2.6 LEGAL/POLICY CONTEXT

The South African high-level policy directives that are relevant to the country's ability to improve economic productivity and growth to mitigate the social challenges are listed below. The National Science, Technology and Innovation Policy advocates for the modernisation of key sectors of the economy to achieve increased productivity and efficiencies.

2024-2029 Medium-term Development Plan

The Medium-term Development Plan (MTDP) 2024-2029 will serve as a government-wide plan for South Africa's 7th Administration. The MTDP focuses on three main priorities: inclusive economic growth and job creation, maintaining and optimising the social wage and building a capable, ethical and developmental state. It addresses challenges such as economic growth, unemployment, poverty and inequality, and proposes structural reforms and policy changes to overcome

27 OECD (2024), OECD Economic Outlook, Volume 2024 Issue 1: An unfolding recovery, OECD Publishing, Paris, Accesses via https://doi.org/10.1787/69a0c310-en

28 African Development Bank Group (2024). African Economic Outlook. Accessed via https://www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_chapter_1.pdf

29 The Presidency (2024). APP 2024/25. Accessed via https://www.parliament.gov.za/storage/app/media/Docs/ann_pln/c115a8f0-ffa1-438d-a64f-f645e6d9b130.pdf

these issues. It emphasises the need for a coordinated approach involving various government clusters and sectors to ensure effective implementation and monitoring of the plan.

The priorities are as follows:

- **Inclusive economic growth and job creation:** Focuses on driving growth in labour-intensive sectors, infrastructure development, cutting red tape for small enterprises, and implementing structural economic reforms to create jobs and promote sustainable economic growth.
- **Maintain and optimise the social wage:** Aims to reduce poverty and tackle the high cost of living by maintaining subsidised basic services, expanding social protection, and improving access to affordable housing and transportation.
- **A capable, ethical and developmental state:** Emphasises rebuilding state capacity, professionalising the public service, strengthening law enforcement to address crime and corruption, and promoting social cohesion and nation-building

Challenges and proposed reforms:

- **Economic growth:** South Africa's economy has been struggling with low GDP growth, high unemployment, and rising inequality. The proposed reforms include prioritising infrastructure development, cutting red tape, and expanding support for small enterprises and entrepreneurs. The CSIR intends to support enterprises and entrepreneurs, through its industry-oriented capabilities and our commercialisation company, CSIR C^3.
- **State capability:** The capability of the state has been weakened by corruption and inefficiencies. Reforms include professionalising the public service, strengthening the role of the Public Service Commission, and implementing digital transformation of public services.
- **Local government:** Local governments face instability and poor service delivery. Proposed reforms include standardising the appointment of municipal managers, improving governance and ensuring financial sustainability.
- **Crime and corruption:** High levels of crime and corruption undermine community safety and business confidence. Reforms focus on strengthening law enforcement agencies, protecting whistleblowers, and tackling organised crime and corruption.

Economic Reconstruction and Recovery Plan

The Economic Reconstruction and Recovery Plan (ERRP) was introduced in response to the economic impact of Covid-19, aiming to stabilise and recover the South African economy. The DPME conducted a rapid evaluation of the ERRP in 2023 using economic review analysis, key informant interviews, and the development of a Monitoring and Evaluation (M&E) Framework.

- **Key findings:** The economy has recovered to pre-2020 levels, but key indicators like employment, fiscal position, fixed investment, and production in several major sectors are still lagging. Implementation of ERRP interventions is ongoing but not yet fully effective.
- **Challenges:** The economy remains fragile due to energy shortages, inefficiencies in transport logistics, and structural constraints.
- **External factors:** Events like the 2022 flood disaster, civil unrest and global shocks have further hindered recovery efforts.
- **Recommendations:** Immediate enhancements to ERRP design, improved M&E, strengthened coordination and in-depth evaluations of specific areas are recommended to ensure better implementation and outcomes.

National Science, Technology and Innovation Policy and the Decadal Plan

The CSIR strategy for 2024/25–2028/29 is aligned with the National Science, Technology and Innovation (STI) Policy. The 2019 White Paper on STI is geared towards harnessing the power of science to deal with South Africa's socioeconomic challenges. The Decadal Plan is the implementation guide for the STI policy. Key areas of intervention recommended in the plan are:

- **Modernising key sectors:** Emphasises innovation in manufacturing, agriculture, and mining to boost productivity and economic growth;
- **New sources of growth:** Explores opportunities in the digital and circular economies;
- **Health and energy innovation:** Targets advancements in healthcare and sustainable energy solutions; and
- **Societal grand challenges:** Addresses major issues like climate change, education for the future, and the future of society.

These areas aim to leverage science, technology and innovation to drive socioeconomic development and sustainability in South Africa.

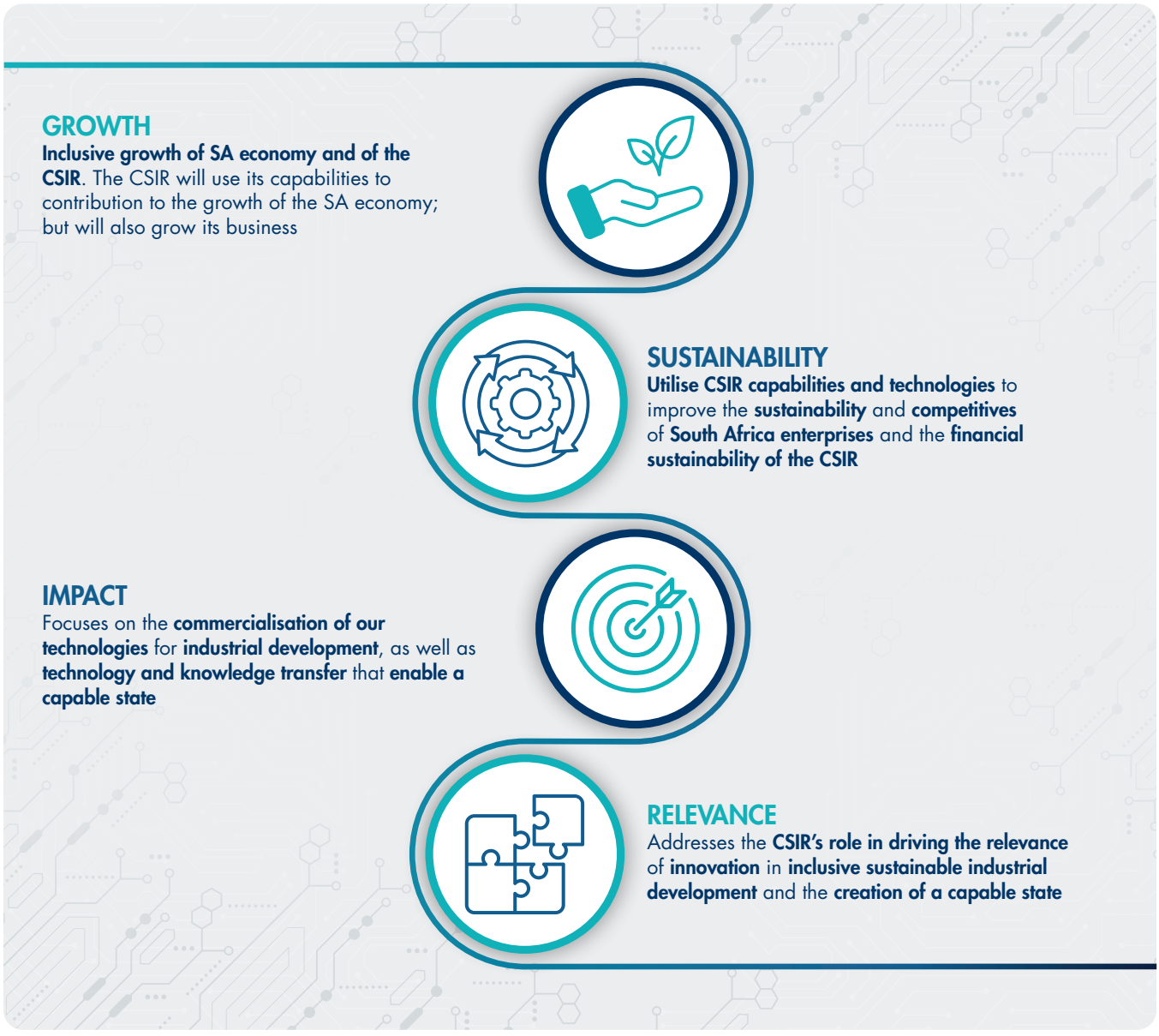
The strategic responses of the CSIR (Section A.3.6.1) speak to the three priorities of the MTDP, "A capable, Ethical and Developmental State", "Inclusive economic growth and job creation" and "Maintain and optimise the social wage". Moreover, these strategic initiatives support the ongoing ERRP and the Decadal Plan for STI policy implementation.

A3 CSIR STRATEGIC RESPONSES

A.3.1 CSIR STRATEGY

The CSIR strategy is focused on the development, maintenance and application of SET capabilities for the inclusive growth of the South African economy, improving the performance of the industry and supporting the creation of a capable state.

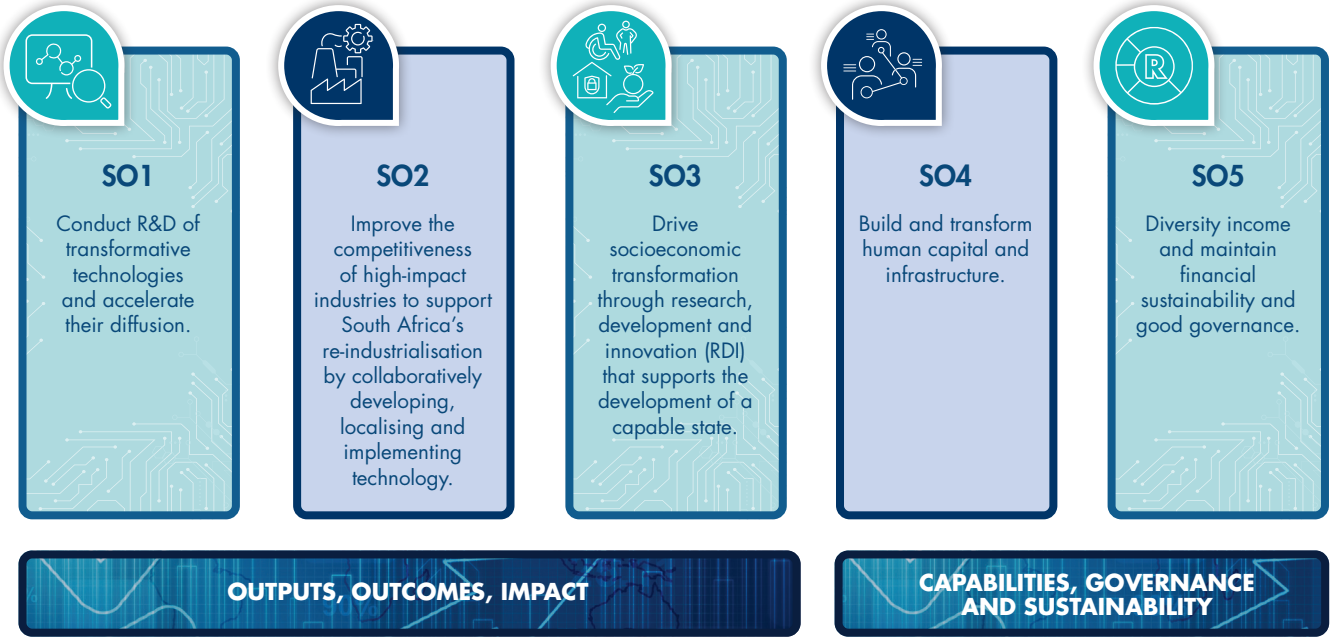
A.3.2 CSIR'S IMPACT STATEMENT



A.3.3 STRATEGIC OBJECTIVES

The CSIR's strategic objectives (SOs) are designed to drive transformative research, development and innovation (RD&I) that supports South Africa's reindustrialisation and socioeconomic transformation. The first objective focuses on conducting RD&I of transformative technologies and accelerating their diffusion to ensure that cutting-edge innovations are effectively implemented. The second objective aims to improve the competitiveness of high-impact industries, thereby supporting South Africa's reindustrialisation efforts and enhancing the country's global economic standing.

Additionally, the CSIR aims to drive socioeconomic transformation through RD&I that supports the development of a capable state, ensuring that technological advancements contribute to broader societal benefits. Another key objective is to build and transform human capital and infrastructure, ensuring a continuous pipeline of skilled professionals and robust infrastructure to support industrial development. Finally, the CSIR seeks to diversify its income streams and maintain financial sustainability and good governance, ensuring the organisation's long-term viability and effectiveness in achieving its mission. Together, these strategic objectives position the CSIR as a key driver of innovation, industrial growth, and socioeconomic development in South Africa. We measure the achievement of these SOs through the balanced scorecard illustrated in Tables 1 (pages 16-17) and A5 (pages 96 and 97) where key performance indicators and associated targets are detailed.

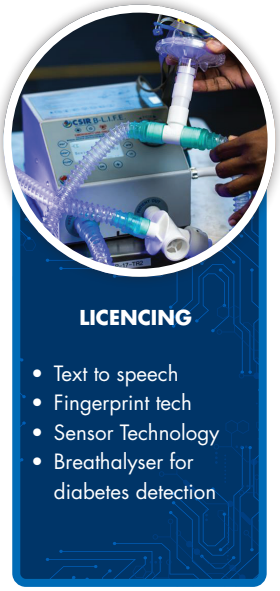


A.3.4 COLLABORATION MODEL

The CSIR's collaboration model is designed to drive innovation and technological advancement through strategic partnerships and joint initiatives. This model includes joint technology development with industry partners, such as Hensoldt and the automotive sector, to co-create new technologies that address specific industry needs. Additionally, the CSIR licenses its technologies, enabling the commercialisation of innovations like text-to-speech systems and sensor technology. By working with private sector companies, government bodies, municipalities and international partners, the CSIR develops tailored solutions that have a direct and positive impact on society and industry.

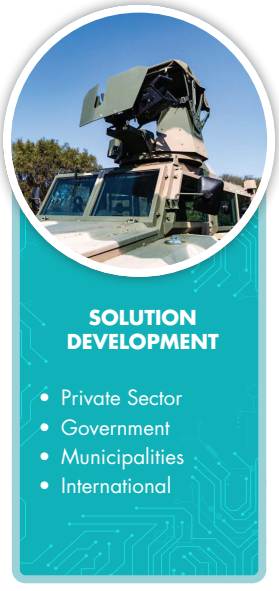
JOINT TECHNOLOGY DEVELOPMENT

- Hensoldt-CSIR
- Automotive sector
- Hall Longmore



LICENCING

- Text to speech
- Fingerprint tech
- Sensor Technology
- Breathalyser for diabetes detection



SOLUTION DEVELOPMENT

- Private Sector
- Government
- Municipalities
- International

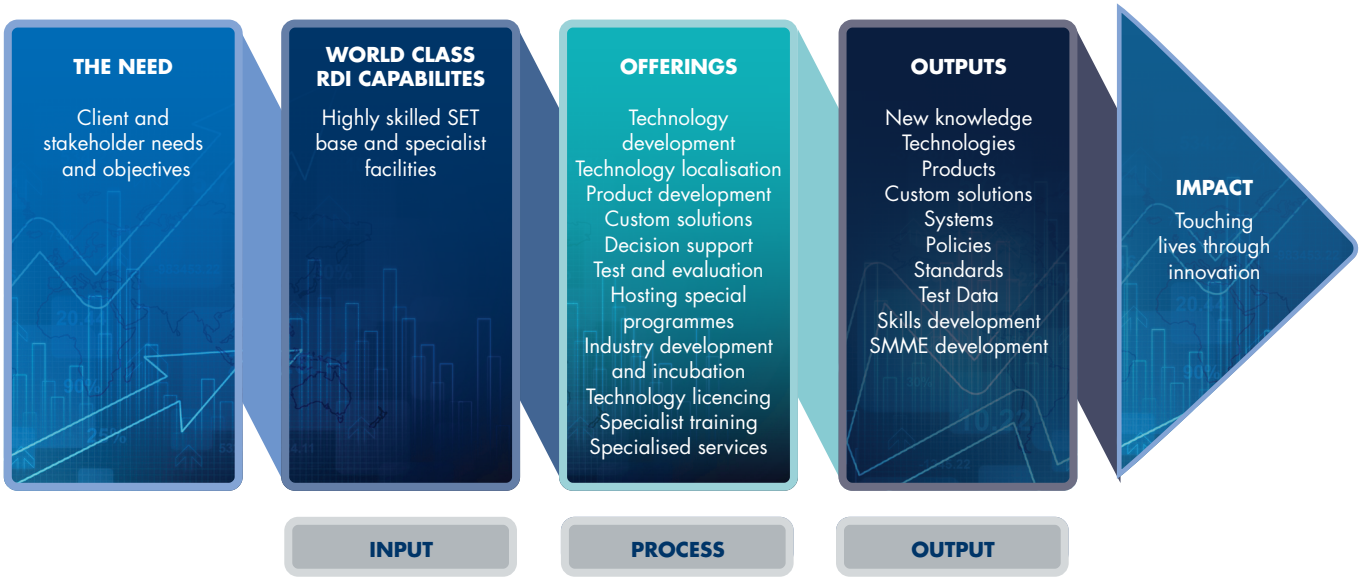
CO-INVESTMENT IN THE DEVELOPMENT OF HUMAN CAPITAL

- HEIs and SETAs
- Government departments
- International partners

Furthermore, the CSIR invests in human capital development through partnerships with higher education institutions, Sector Education and Training Authorities (SETAs), government departments and international organisations. This co-investment ensures a continuous pipeline of skilled professionals to support industrial and technological growth. Overall, the CSIR's collaboration model ensures that research and innovations are effectively translated into practical applications, fostering industrial growth, enhancing competitiveness and contributing to the socioeconomic development of South Africa.

A.3.5 CSIR'S BUSINESS MODEL

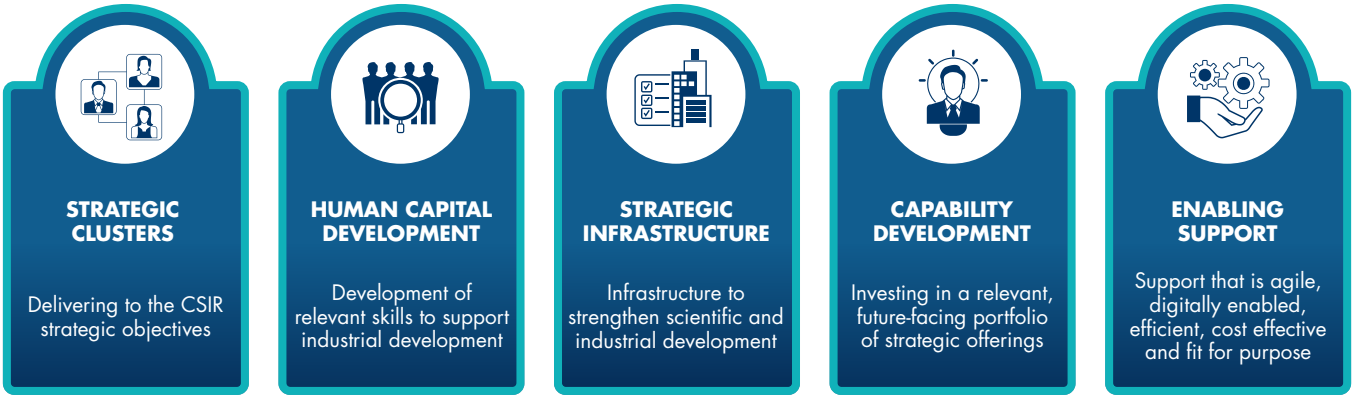
The CSIR's business model is centred around conducting contract RD&I to meet the objectives of its clients and stakeholders. This model involves a comprehensive process that starts with identifying the needs of clients and stakeholders, leveraging world-class RD&I capabilities to develop technologies, products and custom solutions. The CSIR's offerings include technology development, technology localisation, product development, custom solutions, decision support, test and evaluation, hosting special programmes, industry development and incubation, technology licencing and specialised training. The outputs of these activities are new knowledge, technologies, products, systems, policies, standards, test data, skills development and support for Small, Medium and Micro Enterprises (SMMEs).



Additionally, the CSIR's business model emphasises collaboration and commercialisation. The organisation engages in joint technology development with industry partners, licenses its technologies to various entities, and develops tailored solutions for the private sector, government, municipalities and international partners. The CSIR also co-invests in human capital development with higher education institutions, Sector Education and Training Authorities (SETAs), government departments and international organisations. This collaborative approach ensures that the CSIR's innovations are effectively translated into practical applications, fostering industrial growth, enhancing competitiveness and contributing to the socioeconomic development of South Africa.

A.3.6 PILLARS OF CSIR STRATEGY IMPLEMENTATION

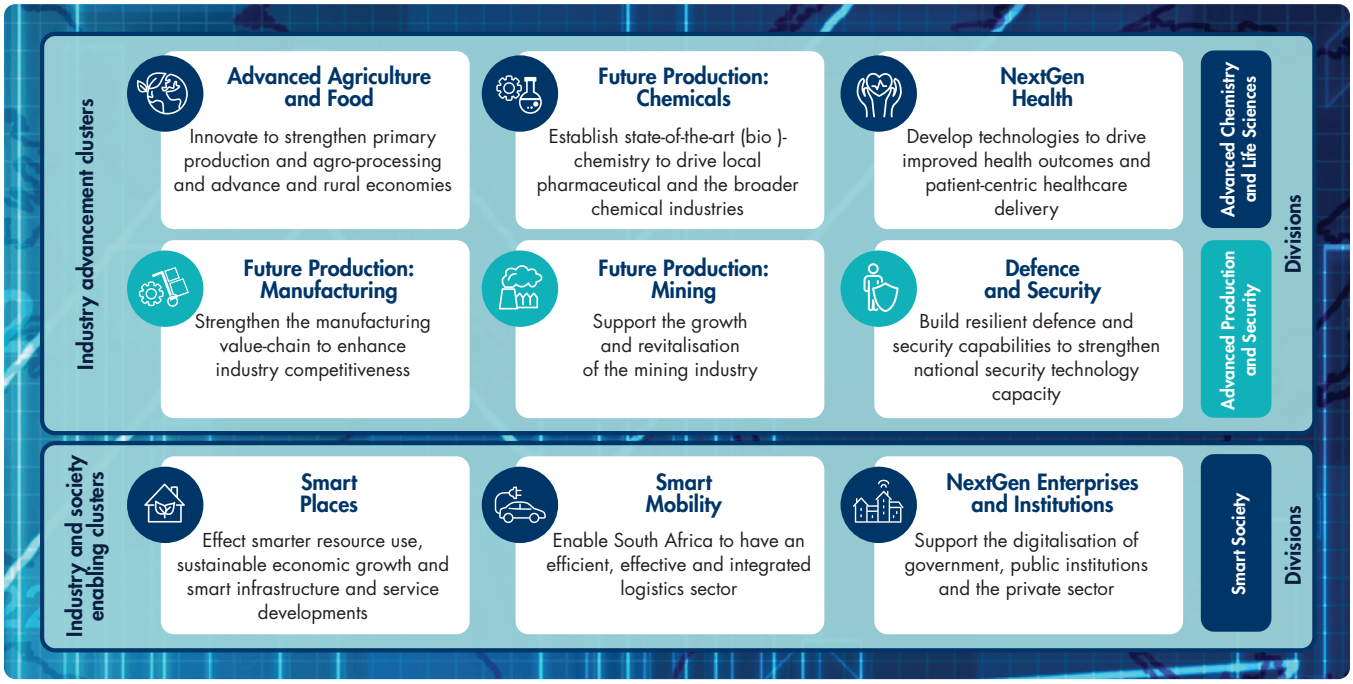
The CSIR's strategy implementation is built on five key pillars designed to drive its strategic objectives and ensure impactful outcomes. The first pillar, Strategic Clusters, focuses on delivering the CSIR's strategic objectives through specialised clusters that address various industry and societal needs. The second pillar, Human Capital Development, emphasises the development of relevant skills to support industrial development, ensuring a continuous pipeline of qualified professionals. The third pillar, Strategic Infrastructure, aims to strengthen scientific and industrial development through the establishment and maintenance of essential infrastructure. The fourth pillar, Capability Development, involves investing in a relevant and future-facing portfolio of strategic offerings, ensuring that the CSIR remains at the forefront of technological innovation and research.



Finally, the fifth pillar, Enabling Support, ensures that the CSIR's operations are agile, digitally enabled, efficient, cost-effective and fit for purpose, providing the necessary support for the organisation to achieve its goals. Together, these pillars create a robust framework for the CSIR to drive innovation, industrial growth and socioeconomic development in South Africa.

A.3.6.1 STRATEGIC CLUSTERS

The CSIR's operating model considered organisational design best practices applied by other research and technology organisations and service-offering firms. The CSIR strategy responds to national priorities and initiatives, and in defining the strategy, an in-depth socioeconomic and technical analysis led to the identification of the sectors that (1) have the potential to increase GDP and create jobs and (2) could benefit from advancements in technological innovation to improve their competitiveness. We define clusters as interfaces between sectors of the economy and technology. Nine strategic clusters through which the CSIR can make the most significant impact were identified and they form the backbone of the strategy and are the RD&I-performing components of the CSIR operating model.



The CSIR's nine strategic clusters are designed to drive South Africa's industrialisation and address key national priorities through focused research and innovation. There are six industry advancement clusters, namely Advanced Agriculture and Food; the Future Production clusters comprising Chemicals, Manufacturing and Mining; NextGen Health; Defence and Security. The other three clusters (Smart Places, Smart Mobility and NextGen Enterprises and Institutions) are industry and society-enabling clusters.

These clusters focus on strengthening local industries, enhancing health security, promoting environmental sustainability, improving transport and logistics, enabling digital transformation and supporting the growth and revitalisation of the mining industry. Together, these strategic clusters ensure that the CSIR's research and innovation efforts are aligned with national priorities, fostering industrial growth, enhancing competitiveness and contributing to socioeconomic development.

Each cluster is managed by an Executive Cluster Manager who reports to a Divisional Group Executive, a member of the CSIR Executive Committee. There are three divisions: The Advanced Chemistry and Life Sciences division aims to strengthen local industries by developing advanced products, processes and materials, particularly in pharmaceuticals and chemicals. The Advanced Production and Security division focuses on enhancing manufacturing competitiveness through digital transformation and Fourth Industrial Revolution (4IR) technologies, supporting the mining industry's growth, and building resilient defence and security capabilities. The Smart Society division works on enabling smarter natural resource use, environmental sustainability and smart infrastructure, as well as improving agricultural production and processing.

CSIR Future Production: Chemicals

The CSIR Future Production: Chemicals cluster develops sustainable, state-of-the-art and innovative biological and chemical conversion technologies, materials and products to support a vibrant and circular South African chemicals and pharmaceuticals industry. The cluster focuses on (i) Sustainable chemical production processes, (ii) Nanostructures and advanced materials development, and (iii) Pharmaceutical process innovation. The cluster has a Centre for Nanostructures and Advanced Materials, a Biomanufacturing Technology Impact Area and a Pharmaceutical Technology Innovation Platform. These areas are complemented by industrial facilities and programmes (BIDC, BIDF and NIDF) together with the newly established Industrial Biocatalysis Hub, Supercritical CO2 Encapsulation Pilot Plant, the Coega-based Fibre Hub and Nano-Micro Manufacturing Facility, which are focused on providing technical support to the benefit of local industry.

The cluster has significantly supported industry over the past five (5) years through various initiatives and facilities such as the BIDC and the BIDF, which provide technical assistance and technology development to SMMEs. The cluster has licensed 19 technologies to SMMEs, aiding in the commercialisation of new processes and materials. Additionally, government-funded programmes like the Industrial Biocatalysis Hub (IBH) and the Forestry Bioeconomy Innovation Cluster have been instrumental in supporting industry sectors. The African Biomanufacturing Workforce Training and Skills Development Programme, funded by the Bill and Melinda Gates Foundation, has also played a crucial role in developing a skilled workforce in the biomanufacturing sector.

The cluster has received significant infrastructure grants to enhance its capabilities, such as the FuturePharma facility for local API production and the Supercritical CO2 Encapsulation Facility for green processes. Collaborative projects with industry partners, such as developing pipe-coating materials with Hall-Longmore and biomanufacturing projects with AECI, have demonstrated the cluster's competence and built long-term relationships. During the Covid-19 pandemic, the cluster engaged in projects to develop anti-Covid therapeutics and materials, collaborating with local companies to address urgent needs. Despite challenges, such as low royalty income and the need for more diversified licensees, the cluster has made substantial contributions to supporting industry, fostering innovation and developing local capabilities in South Africa's chemicals and pharmaceutical sectors.

Challenges and opportunities in the chemicals sector

The chemicals sector is a vital part of the global economy, encompassing a wide range of activities related to transforming raw materials into valuable products. It includes the production of basic chemicals, speciality chemicals, consumer products and agricultural chemicals, producing around 70 000 different products such as cosmetics, fertilisers, pharmaceuticals, and plastics. The sector is integral to various industries, including food, mobility, global health, and the information economy. Current trends in the chemicals sector focus on innovation, sustainability, and resilience. Innovations include advancements in plant-based chemicals, biodegradable polymers, advanced battery materials, and ionic liquids. Sustainability efforts are aimed at reducing emissions and developing renewable technologies, with significant investments in decarbonisation and green chemistry principles. The sector is also working on cost-reduction plans and increasing margins to recover from economic disruptions.

However, it faces challenges from evolving macroeconomic conditions, policy shifts and changing customer preferences. Greater collaboration among incumbents, start-ups, and investors is needed to foster innovation and address global challenges. The rapid pace of technological development requires continuous innovation and adaptation. Strategically, the chemicals sector plays a crucial role in the energy transition, particularly in developing technologies for cleaner energy and emissions reduction. Its activities are essential for the functioning of modern societies, influencing everything from healthcare to agriculture. In summary, the chemicals sector is dynamic and essential, driving innovation and sustainability while facing significant challenges and opportunities for growth.

CSIR Future Production: Chemicals cluster's long-term strategic initiatives

- In the **Advanced Materials initiative**, the focus is on developing nanostructures and advanced materials, including polymers, fibres, cosmetics and energy materials. These innovations are aimed at supporting local industries and SMMEs throughout the entire value chain of product development, from research to prototyping;
- The **Biomanufacturing Technologies initiative** supports sustainable chemical production through bioprocessing, biopharmaceuticals, biocatalysis and biorefinery capabilities. It targets SMME and industry support in product development, with a particular focus on skills development both locally and across Africa; and
- The **Pharmaceutical Technologies initiative** aims to support the development of a local biopharmaceutical industry by providing key infrastructure and flow chemistry expertise.

CSIR Future Production: Chemicals cluster's RD&I responses for 2025/26:

The RD&I responses focus on several key projects across advanced materials, green processes and materials, and pharmaceutical technologies. In advanced materials, the Grow-a-Car project aims to develop fibre-based parts for the automotive industry, with collaborations involving Coega Development Corporation and major automotive companies like VW and Mercedes-Benz. The cluster is also working on developing high-value carbon materials such as carbon fibres and graphene from coal, with support from universities and industry partners. The Just Energy Transition (JET) initiative includes projects to support the transition to a low-carbon economy through green hydrogen, clean coal and carbon dioxide utilisation technologies in collaboration with institutions like the University of Stellenbosch and Sasol.

In green processes and materials, the cluster is developing biodegradable plastics and packaging with a unique Biodegradability Testing Facility. They are also working on commercialising lactic acid production technology for the sugar industry and expanding biocatalysis capabilities to service industry needs, with collaborations involving small and medium enterprises (SMEs) and European institutions.

The cluster is also establishing a bio-foundry for synthetic biology applications and supporting the localisation of active pharmaceutical ingredient production through the Pharmaceutical Technology Innovation Platform, with collaborations involving South African universities and government agencies. These initiatives aim to drive innovation, support industry needs and contribute to the sustainable development of the South African economy.

CSIR Advanced Agriculture and Food

The CSIR Advanced Agriculture and Food cluster aims to contribute to enhanced competitiveness of the agricultural industry and the agroprocessing sector and to support rural development and inclusive economic growth. The cluster has three research groups and a hosted programme. The three research groups are: 1) Agroprocessing, which focuses on the process and product development in the agricultural value chain. It aims to implement advanced agroprocessing technologies to support the competitiveness of agro-based businesses, valorise biodiversity to support socioeconomic development, create new high-value products and support healthy lifestyles through the development of ready-to-eat and highly nutritious products. 2) Precision Agriculture, which focuses on the development of 4IR-based farming practices that can be applied in the analysis of spatial data related to crop productivity and field inputs and real-time monitoring of crop development and anomalies due to variation in soil potential, physical or climatic variables, pest and diseases, or nutrient deficiencies; and 3) Food Safety Programme, which focuses on the development of innovative methods for food safety, quality testing and extending of shelf life with envisioned solutions from farm to folk. The cluster hosts the NEPAD Southern Africa Network for Biosciences (SANBio) programme, a DSTI-funded initiative which provides the cluster and CSIR access to 12 SADC countries. SANBio is a shared biosciences RD&I platform for working collaboratively to address some of southern Africa's key biosciences issues in health, nutrition and health-related intervention areas such as agriculture and the environment.

Key achievements over the past five (5) years include the development of capabilities in cannabis extraction and supporting 21 SMMEs in product and process development for cosmetics, nutraceuticals, and traditional medicines. Additionally, the Precision Agriculture initiative created an Earth Observation-based information system to provide actionable information on soil and crop conditions, improving small-scale farmers' productivity and decision-making capabilities.

In addition to supporting SMMEs, the cluster focused on food safety and indigenous knowledge systems (IKS). The Food safety programme developed standards and technologies to ensure the safety of food products, including mycotoxin standards and mobile laboratory prototypes, which helped rural food suppliers meet compliance requirements and access formal markets. The IKS programme promoted the use of South African medicinal herbal plants, benefiting traditional health practitioners and supporting the implementation of the Nagoya Protocol on Access and Benefit Sharing. The cluster's efforts in these areas, combined with strategic collaborations with public and private sector partners and international organisations, have led to significant financial growth, turning the cluster from a loss-making entity to a profit-making business with annual income growing from R43 million to R77 million over five years.

Challenges and opportunities in the agricultural sector

The agricultural industry faces significant challenges due to climate change, which is expected to increase temperatures and alter rainfall patterns, leading to reduced productivity and potential food shortages. This necessitates the adoption of advanced technologies to ensure sustainable yields. Additionally, population growth is projected to drive up crop consumption and production, further emphasising the need for innovative solutions. The South African agriculture industry is open to innovation, with a focus on precision agriculture, agroprocessing and advanced processing. Market trends indicate a rising demand for alternative and indigenous foods, as consumers seek nutritious and supplementary options. The Agriculture and Agroprocessing Master Plan aims to grow the sector's output by R32 billion by 2030, with the cluster contributing to this goal by supporting SMMEs and start-ups. The cluster's strategic initiatives are aligned with national policies and market demands, positioning it to address industry challenges and capitalise on growth opportunities.

CSIR Advanced Agriculture and Food cluster's long-term strategic initiatives

- A key initiative is the support for **4IR technologies to aid small-scale farmers**. This involves providing actionable farm-level data or intelligence to enable precision agriculture and cost-effective business decisions, such as yield predictions and climate impact modelling. The goal is to increase the efficiency of crop production in the era of climate variability,

enhance the contribution of small-to-medium-scale growers, and understand the movement in crop prices, which has implications for food security, profitability, and logistics. This initiative is a response to the STI-Decadal Plan 2022-2023 on Modernising Agriculture.

- **The agroprocessing initiative** aims to develop complementary medicines, cosmetics, and food products while assisting companies in navigating the IKS regulatory framework to ensure compliance and benefit from commercialising IKS-based products. This initiative also addresses food waste through a circular economy model and post-harvest management technologies.
- **Food safety innovations:** This initiative is dedicated to monitoring unregulated and emerging biological and chemical hazards in food, offering high-end analysis for contaminants, and providing food safety compliance services

CSIR Advanced Agriculture and Food cluster's RD&I responses for 2025/26:

The cluster's RD&I initiatives for 2025/26 focus on several key areas to enhance South Africa's agriculture sector. These include supporting the emerging cannabis market through the development of extraction technologies and innovative product formulations, enhancing food safety with contaminant testing and accredited food testing methods, and utilising 4IR technologies to provide actionable farm-level data for precision agriculture. Additionally, the cluster aims to develop complementary medicines, cosmetics, and food products using indigenous plants, ensuring regulatory compliance and advancing the aquaculture industry with diagnostic tools, vaccines and therapeutics. Collaborations with various private and public sector partners, as well as international organisations, are integral to these initiatives, which aim to improve productivity, sustainability and competitiveness in the agricultural sector.

CSIR NextGen Health

The CSIR NextGen Health cluster focuses on improving access to healthcare and incorporates synthetic biology and state-of-the-art diagnostic and treatment technology with advances in AI to provide integrated digital health solutions. The cluster has an impact area in Medical Devices, Diagnostics and Vaccines (MDDV), which focuses on the Human Diagnostics and Omics and Veterinary Molecular Diagnostics and Vaccines research areas. The MDDV impact area includes a Diagnostics Lab Testing facility. The cluster has a research centre, the Synthetic Biology and Precision Medicine Centre (SynBio Centre) which focuses on Bioengineering and Integrative Genomics, Array Technology and Companion Diagnostics, and Synthetic Nanobiotechnology and Bio-machines Group research areas.

The cluster's achievements over the past 5 years include the establishment of a Covid-19 testing centre that provided crucial services to both public and private sectors, generating substantial income and showcasing the cluster's rapid response capabilities. The cluster also made notable advancements in diagnostic technologies, such as developing a point-of-care rapid test for Acute Kidney Injury (AKI) and a prototype for detecting Aflatoxin B1. Additionally, the cluster achieved significant progress in vaccine development, including the production of virus-like particles for the African Horse Sickness vaccine and the formulation of a blue-tick cattle vaccine, which was licensed to Afrivet.

The cluster also secured international funding from organisations like the Bill and Melinda Gates Foundation, which helped advance projects like the Bioengineered Liver. Strategic partnerships with governmental and private entities facilitated various research projects, contributing to the cluster's growth and impact on the health industry in South Africa. The cluster also focused on synthetic biology and precision medicine, establishing a group for precision cancer treatment research.

Challenges and opportunities in the health sector

In the health sector, the emphasis is on personalised medicine, digital health technologies and AI integration. South Africa's healthcare system faces significant challenges but is prioritising universal health coverage. A significant health challenge with infectious diseases (HIV/AIDS, TB), non-communicable diseases, trauma and mental health issues. The public sector serves 85% of the population with only 48% of the total healthcare expenditure, while the private sector caters to 16% with advanced technology. Implementing National Health Insurance (NHI) to provide universal health coverage is a priority, aiming to address the burden of both infectious and non-communicable diseases. There's a growing emphasis on personalised medicine, digital health technologies, and AI integration in diagnostics and treatment planning and our strategic initiatives respond to these challenges effectively. The CSIR also played a leading role in the review and renewal of the National Biodesign Framework with NSI partners.

CSIR NextGen Health cluster's long-term strategic initiatives

- **Vaccine manufacturing and innovation:** This initiative aims to develop local capabilities to manufacture vaccines and biologics. The goal is to establish local capability to manufacture pharmaceuticals originating from local research and development, addressing the current gap in pharmaceutical manufacturing and enhancing pandemic preparedness through the production of protein-based disease countermeasures. This initiative is part of the CSIR's response to the DSTI Decadal Plan.
- **Next-generation molecular diagnostics:** This initiative focuses on developing and deploying advanced diagnostic technologies to address both human and veterinary health needs. It aims to provide rapid, real-time detection at the point of care (POC) setting, thus enabling quick decision-making and better disease management.
- **Development of tools for drug development, personalised medicines and pharmacovigilance:** This initiative involves creating tools for precision cancer treatments, pharmacovigilance and drug development. The goal is to enhance health outcomes and maximise the return on investment for health through patient-appropriate treatment and enable the regulator to monitor particular products deployed in our markets more effectively.

CSIR NextGen Health cluster's RD&I responses for 2025/26:

The CSIR NextGen Health RD&I initiatives include developing low-cost diagnostics for pandemic preparedness, establishing a cGMP biopharmaceutical manufacturing facility, and training personnel in vaccine and biomanufacturing through the African Workforce Development Programme. Other health projects involve developing bioengineered liver, African cell lines, and a digital biobank, as well as personalised medicine for cancer treatments, with collaborations involving DSTI, SAMRC and international partners.

CSIR Defence and Security

The CSIR Defence and Security cluster aims to drive scientific and technological excellence to secure South Africa, the region and the continent and advance its industrial and human capital base through the development of strategic defence technologies and capabilities for air, land, sea and cyber defence. The cluster has six impact areas: Aeronautic Systems; Optronics Sensor Systems; Command, Control and Integrative Systems; Radar and Electronic Warfare; Landward Sciences and Technology for Special Operations; and one research centre, the Information and Cybersecurity Centre. The cluster conceptualises and develops novel, innovative and integrated solutions that are designed and scaled to meet the safety and security needs of civil society and the public sector. Moreover, the cluster provides strategic, world-class cybersecurity RD&I leadership.

One of the key areas of progress for the cluster in the past five (5) years is in the development of innovative technologies such as the Passive Radar, Electronic Warfare Mission Support System and Surveillance Radar system. These technologies, developed in collaboration with industry partners like Air Traffic Navigation Services (ATNS) and Hensoldt South Africa, are in advanced stages of commercialisation and are expected to generate substantial passive income. Additionally, the Information and Cybersecurity Research Centre has expanded its capabilities, becoming one of the most recognised research centres in Africa, providing advanced cybersecurity solutions to various African countries, industries and government sectors.

The cluster has also enhanced its capabilities in other critical areas. The Optronic Sensor Systems has integrated AI into video imaging, making optronic sensors more effective. The Landwards Systems Impact Area has focused on producing rapid integrated solutions for stakeholders, significantly benefiting the South African Army (SA Army). Furthermore, the Command, Control and Integrated Systems Impact Area has strengthened its command-and-control capabilities through the Cerberus system, which incorporates secure communications and AI. Despite these advancements, the Aeronautics Systems Impact Area remains reliant on international wind tunnel testing contracts, highlighting the need for income diversification.

Challenges and opportunities in the defence and security sector

Politically, South Africa's stance and international relations, especially its neutrality in global conflicts, influence defence interactions. Increasing regional conflicts pose both challenges and opportunities for defence capabilities, while global instability, particularly the US-China competition and instability in the Global South, affects international collaborations and funding. Additionally, threats from extremist groups, arms and human trafficking are significant concerns.

Economically, budget reductions in the Department of Defence (DoD) threaten the cluster's sustainability, and reduced funding for RD&I impacts the cluster's ability to innovate. The reliance on foreign technologies can be a vulnerability, and high costs and unreliable electricity supply affect operations. However, increased global spending on defence presents opportunities for international business. Socially, high unemployment and poverty rates in South Africa lead to more funding for socioeconomic clusters rather than security. Issues like illegal mining, resource theft, drug trafficking and smuggling are prevalent, and public perception is increasingly shaped by social media, with rising social unrest impacting security needs.

Technologically, the fast-paced advancements in technology, especially in cybersecurity and information warfare, require continuous adaptation. Defence technologies often lag behind commercial technologies, necessitating integration and innovation. Environmentally, regulations, especially for testing and evaluation, impact operations and the need for cleaner energy influence future joint exercises and deployments. Legally, international trade restrictions, such as those from the EU, affect the cluster's operations, and delays in obtaining approvals from the National Conventional Arms Control Committee can hinder projects. Managing proprietary information and export licences is crucial for compliance and security.

Opportunities include diversification into markets like the South African Police Service and private security, co-technology development with SMMEs, re-entering the Kingdom of Saudi Arabia market, collaboration with DSTI, SA Defence Industry and HEIs, increased need for systems integration and digitalisation, and membership in the presidential Joint Initiative on Crime and Corruption. Threats include long-term sustainability issues due to dependency on Defence Evaluation and Research Institute (DERI), Armscor's IP position impacting IP ownership, decreasing funding from DSTI and DERI, aggressive recruitment of personnel with scarce skills, decreased government funding for RD&I, reduction in joint military experimentation opportunities, population encroachment and infrastructure vandalism at Detonics, Ballistics and Explosives Laboratory, global and local political tensions affecting collaborations and funding, and lack of clear contracting mechanisms with government departments.

CSIR Defence and Security cluster's long-term strategic initiatives

- **Develop defence technologies that enhance designated sovereign capabilities and ensure strategic independence:** This initiative focuses on establishing RD&I in fields such as aerodynamic test and evaluation, space, stores integration, air operations, and airborne autonomous systems. It aims to create competitive and innovative national surveillance and situational awareness capabilities.
- **Establish a world-class national information and cybersecurity capability:** This initiative aims to create a Virtual Security Operation Centre that provides consolidated cybersecurity situational awareness for government, municipalities, the private sector, and the wider African market. It also focuses on developing locally implemented multimodal identity technologies for secure and reliable identity recognition.
- **Building the capabilities to combat crime:** This initiative targets the reduction of various crime-related challenges, including cash-in-transit crimes, cyber/digital crimes, illegal border crossings, illicit mining, infrastructure-related crimes and social unrest. It also aims to increase interoperability within the security cluster and integrate the CMORE situational awareness platform into operational environments.

CSIR Defence and Security cluster's RD&I responses for 2025/26:

The CSIR Defence and Security cluster's RD&I initiatives for 2025/26 encompass a wide range of projects aimed at enhancing South Africa's defence and security capabilities.

In the Aeronautical Systems area, the cluster is developing a hydrogen fuel cell propulsion unit for Unmanned Aerial Vehicles (UAVs), focusing on decarbonising the transport and aviation industry. Additionally, the cluster is creating a flight control system for hybrid fixed-wing/VTOL UAVs and achieving MEASNET (International Network of Wind Energy Measurement Institutes) accreditation for wind energy equipment testing. The Aerospace Engineering Development Programme aims to enhance skills for designing aerospace systems.

In Command, Control and Integrated Systems, the cluster supports SMMEs and applies AI and machine learning in command-and-control systems. They are also rolling out CMORE (A platform used for situational analysis and decision support) for disaster management in KwaZulu-Natal and expanding the Cerberus platform for digital policing. The Information and Cyber Security Research Centre is working on several projects, including Project Insight, which develops misinformation detection components and deploys a centralised data hub. The Cybersecurity and Ransomware Lab supports SMMEs and develops localised cybersecurity technologies, while the Decentralised Digital Identity project creates a digital identity framework for South Africa.

Landward Sciences initiatives include developing an automated turret subsystem for lightweight tactical vehicles and producing new combat boots and uniform systems for the SA Army. In Optronic Sensor Systems, the cluster is localising smart CCTV technology for crime sensing in the South African Defence Force (SANDF) bases and developing a metaverse for joint warfare training programmes. Radar and Electronic Warfare projects involve demonstrating and producing a radar system prototype, developing a system prototype for low-altitude UAVs, and enhancing airborne SAR capabilities. They are also working on passive radar systems in collaboration with ATNS.

The Technology for Special Operations area focuses on supporting SANDF with technology development and doctrine contributions, as well as developing special operations technology and supporting SMMEs. Integrated Safety and Security initiatives include establishing a Safety and Security Research Institute for crime prevention, developing national security reference architectures, and providing digital solutions and process automation for safety and security interventions. These initiatives collectively aim to advance South Africa's defence and security through innovative research, development, and collaboration with various stakeholders.

CSIR Future Production: Manufacturing

The CSIR Future Production: Manufacturing cluster supports the re-industrialisation of South African industry and is centred around the localisation of key aspects of advanced manufacturing value chains, specifically metal additive manufacturing, injection moulding and casting; product localisation of designated and high-value components, products and equipment; facilitation of access to unique and capital-intensive infrastructure, equipment and tools for SMMEs and digital transformation. Strengths are in the areas of photonics for additive manufacturing, medical point-of-care devices, laser engineering services, advanced manufacturing processes and equipment for casting, metal injection and other powder metallurgy processes, sonar, UV and thermal sensor development for various industrial and health applications, as well as for underwater communications, digital twin development of industrial and production processes for optimisation, robotics and automation implementation and data analytics using machine intelligence and AI techniques. Impact areas include Metals, Machinery and Mining Equipment, Automotive, Health (Medical Devices) and Aerospace and Defence.

Key achievements over the past five (5) years include significant technological advancements, such as the development of digital twins, robotics and AI for industrial processes, as well as the creation of medical devices like the Umbiflow ultrasound system. The cluster also saw commercial success with increased income from laser-based refurbishment services and the development of the PUDU device to prevent cash-in-transit heists. Additionally, during the Covid-19 pandemic, the cluster manufactured 18 000 ventilators using CPAP devices demonstrating rapid response capabilities. Support for SMMEs was also a highlight, with over 20 SMMEs receiving technical and regulatory support to achieve certifications and market entry.

The cluster provided laser-based refurbishment services to key clients like Eskom and Sasol. The CSIR's laser repair innovation for Eskom turbines resulted in significant cost savings, further highlighting the cluster's contributions to the industry.

Support for SMMEs in medical device innovation led to several success stories, including New Horizon Metal and Gideon Inno Textile, receiving ISO 13485 certification and product testing support. Additionally, the Umbiflow project, a point-of-care medical ultrasound device developed in partnership with the South African Medical Research Council (SAMRC), significantly reduced stillbirth rates, showcasing the cluster's impact on healthcare. The cluster also launched the Foundry Technology Centre of South Africa to revitalise the local foundry industry and established the Master Learning Factory in collaboration with merSETA to enhance 4IR training. These initiatives underscore the cluster's commitment to driving innovation, supporting local industries, and addressing national needs effectively.

Challenges and opportunities in the manufacturing sector

The Manufacturing sector is a critical pillar of the South African economy, contributing around 13% to the GDP and providing substantial employment opportunities. It includes key industries such as automotive, metals, industrial machinery, and aerospace, each facing unique challenges and growth prospects. Significant challenges include technical skills shortages, elevated logistics costs and delays, energy constraints, and an evolving regulatory landscape aimed at promoting sustainable practices. Despite these challenges, opportunities exist in the adoption of advanced fourth industrial revolution (4IR) technologies, digital transformation and leaner operational practices.

There are also opportunities in localising production, increasing exports, and driving towards greener and more circular production models. The national drive towards sustainable development positions the sector as a vital contributor to economic resilience. Specific insights into key industries reveal that the automotive industry faces significant changes driven by global trends towards sustainability and technological advancements. The metals and metal processing industry is in decline due to ageing infrastructure and outdated processes, but new processing technologies and circular economy practices present opportunities.

The medical devices manufacturing industry is heavily reliant on imports, but there is a growing domestic manufacturing base with the potential for localisation and export readiness. The industrial machinery and equipment manufacturing industry faces challenges such as infrastructure constraints and global competition, but opportunities exist in renewable energy and industrialisation initiatives. The rail industry, despite poor freight performance, has new opportunities with the opening of the sector to private operators. The aerospace and defence industry is growing, with opportunities in lightweight, advanced materials and laser-based communications. The Manufacturing cluster aims to address these external challenges and opportunities by building world-class capabilities, localising and developing transformative manufacturing methods, and supporting the reindustrialisation of South African industry through the localisation of advanced manufacturing value chains. The focus on awareness, training and skills development is crucial to enabling technology adoption and re-industrialisation, enhancing the competitiveness and sustainability of the South African manufacturing sector.

CSIR Future Production: Manufacturing cluster's long-term strategic initiatives

- **Industrial machinery and equipment:** This initiative aims to support and enhance the localisation of products within the South African industry by developing internationally competitive technologies and products for local manufacture through reverse engineering, systems design engineering, multi-disciplinary design optimisation, and the implementation of a lifecycle product development framework. The envisaged impacts include competitive products and technologies developed with industry, an increase in locally designed and manufactured products exported, and improved industry competitiveness and potential for companies to be included in global supply chains.
- **Medical devices manufacturing and health sector strategy:** This initiative focuses on unlocking a role for the CSIR in the MedTech Masterplan, building sector networking, focusing on healthcare funding streams, innovating in medical devices, supporting SMMEs in MedTech, and increasing regulatory knowledge. The envisaged impacts include improved health and quality of life, growth of the medical device sector, reduced imports/increased exports, sector sustainability and strategic independence.
- **Rail industry development:** This initiative aims to develop and deploy key technologies in rolling stock, infrastructure, operations, maintenance, safety, and security to stabilise and grow rail volumes transported by current and future operators while maintaining stakeholder relationships in the national rail ecosystem. The envisaged impacts include the development and deployment of new rail technologies, localisation of rail components, systems and technologies, savings in replacement and recovery costs for rail operators and the national infrastructure owner, and preservation of jobs in the rail sector.

CSIR Future Production: Manufacturing cluster's RD&I responses for 2025/26:

The CSIR Future Production: Manufacturing cluster's RD&I initiatives for 2025/26 focus on leveraging advanced technologies and fostering industry collaboration to enhance competitiveness and sustainability. Key initiatives include establishing a smart Metal Injection Moulding (MIM) factory and a Learning Foundry to modernise manufacturing processes and provide hands-on training. The cluster aims to revitalise the metals and metals processing industry through the Foundry Technology Centre of South Africa and monetise strategic facilities like MIM and Hot Isostatic Press . In the automotive sector, the focus is on developing an e-micromobility industry and implementing Learning Factories to support local suppliers. The MedTech sector strategy involves engaging with stakeholders to support the MedTech Master Plan and developing in-house medical devices. Product development initiatives include sonar R&D for the SA Navy, industrial inspection systems, and pre-production additive manufacturing machines. The cluster also emphasises manufacturing as a service, laser shock peening, and developing robotics and rail technologies to enhance operational efficiency and safety. Collaborative programmes in photonics and additive manufacturing further support these efforts, aiming to drive innovation and reindustrialise the South African manufacturing sector.

CSIR Future Production: Mining

The CSIR Future Production: Mining cluster currently has two impact areas, namely Mining Testing and Training and Mining and Minerals Resources (MMR). Mining testing supports the zero-harm objective by providing quality, independent testing and verification services to the mining industry, while the MMR impact area offers technical expertise in rock engineering, geotechnical solutions, and bespoke mining-related studies. The cluster has carved out a new developmental path that will expand its impact areas into three technology areas, namely Mine Digitalisation and Automation (including, but not limited to, digitisation and automation of the mining value chain through design and deployment of IoT sensors, mine automation, digital integration and application of big data analytics to enable better decision support); Extraction Mining Process (includes but not limited to the application of advanced geophysics tools, sensors to support structural mapping of resources to improve mining, extraction of resources, improve safe conditions, e.g., remote early entry examination, preventing fall of ground) and Optimised Energy and Decarbonisation (supporting the mining industry with its decarbonisation drive involves supporting mine electrification, improving energy efficiency and grid stability).

The cluster has made significant strides in enhancing safety and efficiency in the mining industry through innovative projects. One notable initiative is the Collision Prevention Digital Twin, which uses artificial intelligence, machine learning, and data analytics to provide near real-time risk predictions for Trackless Mobile Machines (TMM). This tool helps prevent collisions, improves decision-making, and enhances overall safety and productivity in mining operations. Another impactful project is the Enhanced 4IR Training for Zero Harm, which employs virtual reality to simulate emergencies like underground fires and explosions. This immersive training method improves safety and health by enhancing behavioural responses and promoting the adoption of 4IR solutions in the mining sector.

Additionally, the cluster has re-established its geotechnical sciences capabilities to address challenges such as the fall of ground in deep-level mining operations. This includes the development of the Integrated Thermal and Acoustic Device and a geophysical toolbox for structural mapping and hazard detection. These technologies enhance safety, maximise resource utilisation, and extend the life of mines. The cluster also supports the local mining industry through practical industrial solutions, such as developing lightweight chemical canisters and locally manufactured brake liners and providing mine winder rope testing services. These efforts demonstrate the cluster's commitment to innovation, safety and sustainability in the mining industry.

Challenges and opportunities in the mining sector

Globally, the mining industry is grappling with dampened commodity prices, particularly affecting platinum group metals (PGMs) due to the rising demand for electric vehicles. This shift has led to decreased economic growth and demand for traditional mining outputs. In South Africa, the mining industry faces additional hurdles, including volatile exchange rates, high inflation and frequent power outages caused by the national energy crisis. These power outages, coupled with rising electricity costs, have significantly strained operational expenses. Furthermore, the deterioration of road, rail and port infrastructure has disrupted the logistics of transporting raw materials, further hindering production and contributing to a decline in mining output.

Despite these challenges, the mining sector remains a vital component of the South African economy, contributing substantially to GDP and employment. The industry is also under increasing pressure to adopt sustainable practices and meet environmental, social and governance standards. This includes efforts to reduce carbon footprints and implement cleaner technologies. The sector is also experiencing a digital transformation, with a growing emphasis on digitalisation, automation and data analytics to enhance efficiency, safety and productivity. These technological advancements are seen as crucial

for maintaining competitiveness and addressing the industry's evolving needs. Overall, the external context underscores the need for strategic planning, innovation and collaboration to navigate the complex landscape and ensure the mining industry's long-term sustainability and growth.

CSIR Future Production: Mining cluster's long-term strategic initiatives

- The **Decarbonisation using Green Mobility in Mining Initiative** aims to develop a decarbonisation programme for the mining industry, focusing on technologies that support green mobility. This initiative is expected to contribute to the decarbonisation of the mining industry, develop high-impact decision support information, and support local SMMEs in participating in the clean energy transition.
- The **Digital Integration Platforms Initiative** aims to develop significant capability in system integration and digital platforms that support the integration of systems used by various original equipment manufacturers (OEMs) and software providers in the mining industry. This initiative is expected to drive value for the mining industry by reducing the number of systems in use where information and data are duplicated, simplifying systems and digital platforms, and reducing system costs.
- The **Safety and Health Initiative** aims to develop high-impact decision-support tools to assist in decision-making for mining operators and management. This initiative is expected to improve the planning and monitoring of mining operations for process optimisation, provide operational decision support, and contribute towards the zero harm objective of the mining industry.

CSIR Future Production: Mining cluster's RD&I responses for 2025/26:

The RD&I initiatives for 2025/26 for the mining cluster include several key projects aimed at advancing technology and improving safety, efficiency and sustainability in the mining industry. These initiatives encompass a range of objectives and collaborations. One major project is the competency-based immersive and experiential mine worker emergency response training, which aims to operationalise immersive training offerings and develop additional modules, collaborating with local training content developers. Another significant initiative is the development of a novel chemical canister for self-contained self-rescuers, designed to be more compact and lightweight, with validation through selected SANS 1737 tests in collaboration with Afrox. The TMM Digital Twin project focuses on creating a digital risk profiling tool for open pit and underground mines, involving the development of governance foundations and commercialisation modules in partnership with the mining industry. Additionally, the rope test data analytics and rope inspection video analytics project applies data analytics to rope test databases and visual inspection videos, aiming to provide insights and predictions for rope life, with mining companies as collaborators.

The Rock Engineering Assistant project is developing a platform for rock engineering specialists, including industry trials and application expansions. The digital underground auditing tool project aims to enhance the accuracy and dependability of underground support location and rock mass quality audits involving the development of software and hardware specifications. The decarbonisation using green mobility in mining initiative focuses on developing a decarbonisation programme with technologies supporting green mobility, including the development of an H2 FEED platform. Lastly, the Eagle Eye project involves machine vision for TMM and infrastructure assessment, aiming to refine asset identification algorithms through operational pilots in collaboration with the mining industry and the Minerals Council South Africa. These initiatives collectively support the mining industry in achieving strategic goals, including improving safety, efficiency and sustainability through innovative technologies and practices.

CSIR NextGen Enterprises and Institutions

The CSIR NextGen Enterprises and Institutions cluster aims to enable digital transformation in government, public institutions and industry. This aim is accomplished through focused initiatives in impact areas and centres. The cluster has three impact areas, namely e-Government, Networked Systems and Applications and Operational Intelligence. Moreover, the cluster also contains the Emerging Digital Technologies for 4IR research centre and the National Integrated Cyberinfrastructure System (NICIS), which is ringfenced and funded by the DSTI. Due to the cross-cutting nature of digitalisation, ICTs and 4IR technologies, the cluster plays an enabling role in a wide range of application domains in the public and private sectors. The impact areas and research centres of this cluster provide solutions in domains such as Government Service Delivery, Digital Health, Energy, Telecommunications, Education, Disaster Management, Agriculture, Mining and Financial Services, among others.

The cluster has made significant strides in various sectors over the past five years. In the realm of digital health, the cluster developed the Electronic Vaccine Data System to manage Covid-19 vaccine distribution and is currently working on a National Electronic Medical Record for HIV and TB, funded by the Centre for Disease Control (CDC). Additionally, the cluster leads a multi-country coastal monitoring initiative funded by the African Union Commission, which includes integrated vessel tracking and harmful algae bloom monitoring. Efforts to bridge the digital divide include deploying solar-powered ICT centres in rural areas and enhancing computer education and information literacy.

In financial inclusion and intelligence, the cluster is developing technologies to combat financial fraud and enhance regulatory compliance, such as a blockchain intelligence platform that helps detect illicit transactions and supports financial regulators and institutions. In smart government services, projects like electronic monitoring for correctional services involve developing monitoring devices to enhance the management of correctional facilities. The cluster also provides localised cloud platform offerings to protect data sovereignty and optimise application performance for government services. The Networked Systems and Applications area focuses on improving connectivity and digital inclusion, exemplified by the Rural Television White Space Network Operator Support Programme, funded by the UNDP, which enhances broadband access in rural areas, creating job opportunities and improving digital literacy. Operational Intelligence has developed tools like the Advanced Fire Information System to help Eskom monitor wildfires and protect electricity transmission infrastructure, and an election prediction model in collaboration with the South African Broadcasting Corporation (SABC) to build public trust in the electoral process. NICIS supports South Africa's research community with high-performance computing and data infrastructure, contributing to significant projects like the identification of Covid-19 variants.

Challenges and opportunities in the digital economy

The digital economy in South Africa is expected to grow significantly, reaching 7.8% of the GDP by 2025, which presents opportunities for enhancing digital capabilities and expanding cyberinfrastructure initiatives. However, South Africa faces challenges in industrialisation and technology adoption, with a widening trade deficit in the ICT sector and heavy reliance on foreign technologies. The public sector's digital maturity is low, ranking 103rd out of 198 countries in the World Bank's GovTech Maturity Index, underscoring the need for accelerated digital transformation. The financial landscape is evolving rapidly, with increasing digital transactions and emerging financial systems like Fintech and decentralised finance, posing new challenges in combating financial fraud and crime, which have led to South Africa's greylisting by the Financial Action Task Force (FATF). Additionally, the country's ICT infrastructure is inadequate, with poor coverage, high costs, and a congested radio frequency spectrum, affecting digital inclusion, especially given that only 11% of South Africans

have English as their home language. There is also a growing global interest in AI applications, providing an impetus to deploy AI capabilities to address national challenges. Lastly, rising geopolitical tensions related to rare earth metals and semiconductors, exacerbated by recent chip shortages, impact planning for the acquisition of semiconductor products and execution of RD&I initiatives. These external factors collectively influence the strategic priorities and initiatives of the cluster, guiding their efforts to leverage digital technologies for socioeconomic development and competitiveness.

CSIR NextGen Enterprises and Institutions cluster's long-term strategic responses:

- One key focus is on Smart Government Services, where the CSIR aims to enhance public service delivery through **digital technologies**. This includes developing foundational technologies for the National Health Insurance, extending the National Oceans and Coasts Information Management System across Africa, and implementing e-participation platforms to improve public engagement in policy matters.
- In the realm of **financial inclusion and intelligence**, the CSIR is responding to South Africa's greylisting by the FATF by developing technologies to enhance financial sector resilience and compliance. This includes creating platforms for real-time digital asset analytics, compliance and tax reporting software, and payment systems for digital assets. These efforts aim to promote financial inclusion, support law enforcement in detecting illicit financial activities, and improve the insurance industry's ability to price natural disaster risks. The focus is on leveraging distributed ledger technologies, AI, and data science to build robust financial intelligence capabilities.
- Lastly, the **smart digital services and operations** initiative seeks to bridge the digital divide and promote digital inclusion, particularly in rural areas. The CSIR plans to develop sustainable networking and cloud services, improve network coverage, and create language technologies to overcome communication barriers. Additionally, the establishment of the Empowerment Hub for South Africa aims to foster cross-sector collaborations and support digital transformation. These initiatives are intended to position South Africa as a leader in the digital economy, reduce ICT costs and enhance access to information and services for all citizens.

CSIR NextGen Enterprises and Institutions cluster's RD&I responses for 2025/26:

The RD&I initiatives for 2025/26 in the CSIR NextGen Enterprises and Institutions cluster focus on several key areas. Under Smart Government Services, the initiatives include the development of a National Electronic Medical Record, health data analytics, NHI information systems, and a National Digital Health Interoperability Framework. Additionally, the extension of the National Oceans and Coasts Information Management System across Africa, the implementation of e-participation platforms in municipalities, and the evolution of electronic monitoring and online radiation monitoring systems are planned. The cluster also aims to increase the uptake of localised cloud platforms and transform education through digital solutions. The Financial Inclusion and Intelligence initiatives involve developing tools for fraud detection in banking transactions, trustworthy AI in credit and lending systems, digital asset tax tools, and blockchain analytics for detecting illicit financial transactions. There is also a focus on applying geospatial modelling to manage wildfire risks in the insurance industry. The Digital Economy Enablement initiatives include the development of foundational digital capabilities, immersive educational solutions, spectrum sharing for mobile networks, and projects like Voice Dubbing 4 Africa and NLP. NICIS will continue to provide high-performance computing capabilities and support research enablement in South Africa, with collaborations with Conseil européen pour la Recherche Nucléaire (CERN) SADC and the Square Kilometer Array (SKA) partner countries. These initiatives aim to leverage digital technologies to improve government services, enhance financial inclusion, support the digital economy, and provide robust cyberinfrastructure.

CSIR Smart Places

The CSIR Smart Places cluster aims to effect smarter resource use, optimisation of hard and soft infrastructure, and efficient and effective service developments directed towards enabling competitive socioeconomic environments, sustainable ecosystems and economic growth. The cluster has four impact areas, namely Inclusive Smart Settlements and Regions, Functional Building Infrastructure, Sustainable Ecosystems and Holistic Climate Change. The cluster has two research centres, namely the Water Centre and the Energy Centre.

The CSIR Water Research Centre enhances water security and promotes sustainable management through real-time water quality monitoring, smart distribution technologies and innovative wastewater treatment solutions. It advances desalination and brine beneficiation processes and develops tools like the National Water Data Repository and a smartphone app for agricultural water needs. Collaborating with the government, research institutions and industry, the centre aims to ensure water resource availability, inform policy and drive sustainable practices.

The CSIR Energy Research Centre focuses on developing sustainable energy solutions, including renewable energy technologies, green hydrogen production and advanced battery materials. It also works on optimising thermal systems and improving energy efficiency across various sectors. By collaborating with the government, research institutions and industry partners, the centre aims to enhance energy security, support policy development, and promote a low-carbon economy.

Moreover, the cluster also contains a hosted programme which consists of two sub-programmes that are managed on behalf of the Department of Trade, Industry and Competition (the dtic). The cluster's impact covers inter alia the following sectors: Transportation and Logistics; Utilities (electricity, gas and water); ICT; Business and Financial Services; Education; Health; Agriculture; Metals, Mining and Quarrying; Manufacturing (Petroleum Products, Chemicals, Rubbers and Plastics; Metals, Metal Products, Machinery and Equipment; Food, Beverage and Tobacco); Human Settlements; Safety and Security and Construction.

The cluster has made significant strides in urban planning and environmental sustainability over the past five years. One of the notable achievements is the implementation of South Africa's first integrated urban growth and transportation model for the Gauteng City Region. This model aids government planners and policymakers in making informed decisions regarding land use and transportation, directly impacting urban development strategies. Additionally, the Green Book initiative has been instrumental in helping municipalities adapt to climate change by planning climate-resilient urban settlements. This tool provides essential resources for effective climate-related planning, ensuring that urban areas are better prepared for future environmental challenges.

In the realm of industry support and innovation, the cluster has developed the Energy Storage Testbed, which tests and enhances the performance of energy storage technologies, fostering innovation in this critical area. The cluster has also supported numerous SMMEs through programmes like the National Cleaner Production Centre and the National Foundry Technology Network, providing technical interventions, training, and development support. Another significant project is the development of a metakaolin cement plant, which produces eco-friendly cement blends, supporting the green economy and addressing industry demands for sustainable building materials. Furthermore, the cluster's Municipal Capability and Partnership Programme has strengthened municipal service delivery systems, particularly in areas affected by mining activities, focusing on water quality and infrastructure development. These initiatives highlight the cluster's commitment to leveraging innovative technologies and sustainable practices to enhance urban planning, environmental sustainability, and infrastructure development across South Africa.

Challenges and opportunities in the human settlements area

The World Cities Report 2022 by UN-Habitat explores the future of cities amid global challenges such as Covid-19, climate change, inequality, and conflicts. It emphasises building resilience across economic, social, and environmental dimensions through multilateral collaboration, integrated urban planning, and addressing socio-spatial inequalities. The report highlights varying urbanisation trends, with developed regions facing ageing infrastructure and populations while developing regions, particularly in Africa and Asia, experience rapid urban growth and challenges like poverty and inadequate infrastructure. It outlines three future scenarios for cities—high damage, pessimistic, and optimistic—advocating for inclusive planning and sustainable development to achieve equitable, green, resilient and inclusive cities. Key priorities include addressing inequality, improving infrastructure, and planning for ageing populations in developed regions, reducing poverty and improving housing in developing regions. The report also stresses the importance of effective urban and territorial planning, sustainable financing, green investments, public health, and multilevel governance for resilient urban futures, alongside the role of innovation and technology in enhancing productivity, social inclusion, and environmental resilience.

Industry trends in climate-resilient building design and planning highlight significant growth driven by increasing regulatory demands for energy efficiency and resilience, the rising adoption of green building practices, and technological innovations in distributed power generation and water recycling. The market is expected to expand notably, with strong growth in regions like Asia and North America. Key opportunities include advancements in battery technologies, the integration of resilient energy solutions like microgrids, and the development of advanced building materials such as high-performance insulation and cladding systems. These trends are supported by a robust supply chain and active industry organisations promoting standards and best practices.

Challenges and opportunities in the energy sector

There are several legislative and policy challenges that the Department of Mineral Resources and Energy is currently facing. Strategically and operationally, the government is working on several key initiatives. These include connecting 100 000 households to the grid and 15 000 households using solar home technology, finalising governance and funding structures for the procurement of 2 500 MW of nuclear power and addressing grid challenges affecting the Renewable Energy Independent Power Producer Procurement Programme. The company is also finalising the development of the Integrated Resource Plan (IRP23).

In terms of energy and infrastructure, the government is accelerating energy performance certification for buildings and setting minimum energy performance standards for appliances. The government is also providing non-grid electrification to 15,000 households per year, mainly using solar technology, and overseeing the long-term operation of the Koeberg Nuclear Power Plant, extending its design life to 2045. Additionally, the government is completing a feasibility study for a Multi-Purpose Reactor to replace the SAFARI-1 Research Reactor by 2030 and developing a feasibility study and funding strategy for a Central Interim Storage Facility (CISF) for high-level radioactive waste.

Challenges and opportunities in the water sector

South Africa's water sector investment requirements for 2050 highlight a significant funding gap, with an average annual investment of R256 billion needed to achieve the SDGs and NDP objectives. Current funding levels are insufficient, even with optimised sources like improved tariff collection and development charges. Climate change poses additional challenges, potentially increasing investment needs by 8% under drier conditions. Proactive measures such as aggressive water conservation, demand management, and clearing invasive alien plants are essential but require substantial upfront investment and strong institutional capacity, which are currently lacking in many areas.

The speciality water treatment chemicals market is experiencing significant growth driven by several key trends. These include the increasing global population and urbanisation, which are boosting the demand for clean water and effective wastewater treatment solutions. Additionally, the decline in freshwater resources and the implementation of strict environmental regulations are pushing industries to adopt advanced water treatment technologies. The market is also seeing a shift towards the industrial sector, with high profit margins motivating companies to focus on providing value-added services. Furthermore, scepticism towards alternative and advanced technologies is gradually diminishing, leading to greater acceptance and integration of innovative solutions like nanotechnology and digitalisation in water treatment processes. These trends collectively contribute to the market's expansion and the development of more efficient and sustainable water treatment solutions.

CSIR Smart Places cluster's long-term strategic responses:

- The **Human Settlements, Utilities and Services Initiative** focuses on creating sustainable and smart human settlements by integrating green infrastructure and promoting climate change adaptation and mitigation. It aims to support the building of a capable state by providing end-to-end service solutions that ensure energy and water security. The initiative also emphasises the importance of disaster mitigation and management, net-zero carbon emissions, and carbon trading. By addressing these areas, the initiative seeks to enhance the quality of life in communities and contribute to broader socioeconomic development.
- The **Industrial Revitalisation Programme** is designed to support the transition to a low-carbon, climate-resilient, and globally competitive industry. It focuses on revitalising industrial parks and economic development zones by infusing eco-industrial methodologies, such as sustainable energy, water and waste management. The programme also promotes the Just Energy Transition, which aims to ensure that the shift to a low-carbon economy is fair and inclusive. By enhancing industrial competitiveness and supporting economic transformation, this initiative seeks to create jobs and drive sustainable economic growth.
- The **Ocean, Coastal and Marine Science and Ports Operations Initiative** aims to lead in Southern Ocean science and technology, focusing on sustainable coastal and marine ecosystems. It addresses issues such as coastal erosion, flood risk and pollution while promoting ecosystem restoration and sustainability. The initiative also emphasises efficient green port operations and the development of coastal industries, including energy and fuel. By integrating eco-greening technologies and bio-enhancement, the initiative seeks to create resilient coastal communities and support the blue economy. This approach not only protects the environment but also enhances socioeconomic livelihoods in coastal regions.

CSIR Smart Places cluster's RD&I responses for 2025/26:

- The plan includes several initiatives aimed at **enhancing human settlements** through sustainable and innovative practices. These initiatives focus on developing smart technologies and infrastructure to improve energy and water security, green infrastructure, and climate change adaptation. Key projects include the implementation of the STI4SHS roadmap to support sustainable human settlements, the Municipal Capability and Partnership Programme to improve service delivery and address infrastructure challenges, and the Green Cement Pilot Plant to promote sustainable construction. Additionally, the plan includes scenario planning support for cities using modelling and simulation, and the GreenBook 2.0 project to aid cities in climate adaptation. These efforts are supported by collaborations with various municipalities, government departments, and industry partners to create more resilient and efficient communities.
- The plan outlines several key initiatives in **the energy sector** aimed at promoting sustainability, innovation, and efficiency. These initiatives include developing systems analysis and capabilities for green hydrogen development in collaboration with national and international partners, optimising thermal systems through pilot testing and market studies, and conducting research on sustainable battery electrode materials to support the South African battery value

chain. Additionally, the plan includes the development of a Solar AI Defect Detection Tool for identifying defects in solar panels, feasibility studies and market assessments for battery technologies and critical minerals, and the creation of an off-grid traffic light system for municipalities to enhance energy efficiency and reliability. These efforts are supported by collaborations with various industry partners, government departments, and research institutions to drive innovation and sustainability in the energy sector.

- The plan outlines several key initiatives in **the water sector** aimed at enhancing water management and sustainability. These initiatives include developing a National Water Data Repository to improve data accuracy and accessibility, implementing a Smart Water Network Management system to optimise water distribution, and creating a smartphone application for real-time water use predictions in orchards. Other projects focus on innovative wastewater treatment solutions, such as low-cost phycoremediation and decentralised treatment systems, as well as the valorisation of acid mine water and advancing desalination technologies. Collaborations with various universities, government departments, and industry partners are integral to these efforts, ensuring a multidisciplinary approach to addressing water-related challenges and promoting sustainable practices.

CSIR Smart Mobility

The Smart Mobility cluster responds to the challenges and opportunities in society and the economy associated with the mobility of goods and people and its enabling infrastructure, systems and operations. The cluster has two impact areas, namely Transport Systems (service-oriented) and Transport Infrastructure Engineering (technology-focused). There are new areas of specialisation under development within the cluster, including smart logistics management, transport safety and 4IR solutions in transport and mobility. The cluster represents the confluence of various key elements including technology, mobility infrastructure, mobility systems and solutions and people to create demand-responsive, integrated, safe and cost-effective transport and mobility networks. The outcomes of the interventions will be measured in terms of increased network efficiencies, improved safety and the reduction of the generalised life-cycle cost of transport systems and infrastructure.

The cluster has significantly advanced South Africa's transportation and logistics sectors by supporting a variety of clients with impactful projects. For the Gauteng Department of Roads and Transport, the cluster developed digital solutions for law enforcement in the minibus taxi industry, implemented subsidised bus contracts, and created taxi ranks economic hubs. The cluster also provided comprehensive support for road asset management, conducted household travel surveys to measure the mobility impact of Covid-19, and assisted with the regulation of number plates and optimisation of government fleet management services. The South African National Roads Agency Limited (SANRAL) benefited from foresight studies, advanced asphalt and bituminous binder technologies, unbound and stabilised material testing, and work zone safety and driver behaviour projects. Transnet National Ports Authority received support for wind, wave, current and tide monitoring for eight ports, port breakwater monitoring, aerial photographic surveys, bathymetric surveys and longwave studies for the Port of Cape Town.

The City of Johannesburg collaborated with the cluster to develop a secondary network operational plan, restore the city's transport modelling capability, and create an Integrated Public Transport Network (IPTN) plan. The National Treasury was supported in city modal integration to accelerate the implementation of IPTNs, the devolution of provincial bus functions to metros, and spatial planning support for sustainable and transformative IPTNs. Additionally, the cluster engaged with Eskom on fly ash beneficiation and smart roads projects and with Transnet Freight Rail on ballast research and development. Various provincial and municipal authorities benefited from infrastructure development, preservation, and asset management programmes, as well as participation in Operation Phakisa for small ports development. These projects highlight the cluster's role in enhancing transport infrastructure, improving public transport systems, and supporting strategic planning and policy development for various government and industry stakeholders.

Challenges and opportunities in the transport sector

Several key technologies reshaping the transportation sector include smart and sustainable infrastructure, such as AI-powered systems for traffic management and smart asset management, which enhance road safety and efficiency. Emerging passenger mobility trends like autonomous vehicles, shared mobility, and electrification are also highlighted. In freight transportation, innovations such as digitisation, automation, electric trucks and drones are transforming logistics and supply chain management.

Freight transportation is undergoing significant transformation through the adoption of various innovative technologies. Digitisation is streamlining operations by replacing manual processes with digital tools, enhancing efficiency and visibility. Automation, including the use of robotics and AI, is reducing labour costs and errors in freight handling. Electric trucks and autonomous vehicles are being introduced to lower emissions and improve safety and reliability. Drones are providing quick delivery solutions to remote areas, while IoT technology connects devices for real-time data and better asset management. Blockchain ensures secure and transparent transactions and advanced systems like next-generation air control and advanced train control systems enhance the safety and efficiency of air and rail freight. Additionally, zero-carbon bunker fuels, such as green ammonia, are being explored to reduce maritime emissions, contributing to a more sustainable freight transportation system.

Additionally, enabling policy support through promotional, regulatory, financial, and platform strategies is crucial for the successful deployment of these technologies. The Green Transport Strategy for South Africa (2018-2050) aims to reduce greenhouse gas emissions from the transport sector by 5% by 2050. The strategy focuses on shifting from private to public transport, investing in rail infrastructure, and promoting cleaner fuels and technologies like electric vehicles and hydrogen fuel cells. It also emphasises the importance of integrated transit systems, public awareness and funding through public-private partnerships and international climate funds. The ultimate goal is to create a sustainable, efficient and integrated transport system that supports economic growth while minimising environmental impacts.

CSIR Smart Mobility cluster's long-term strategic responses:

- One of the key initiatives is the development of **intelligent transport systems and operations**. This involves creating methods, systems, models, and technologies to promote sustainable transport. The initiative leverages core disciplines such as transport and traffic engineering, transport economics, structural engineering, ICT, data science, computer engineering and software development. The goal is to establish a safe, accessible, and efficient transport network that supports inclusive growth and job creation.
- Another significant initiative is **transport infrastructure engineering**. This initiative aims to develop engineering and technological solutions for the efficient and effective design, construction, maintenance, and management of mobility infrastructure. The focus is on operational sustainability, climate adaptation, and resilience while endorsing circular economy principles throughout the sector. The expected outcomes include improved safety and efficiency of ports and protected coastal zones, as well as smart and resilient road and rail infrastructure.
- The third major initiative is the enhancement of the **national logistics system**. This initiative is critical for industrialisation and competitive local and international trade. It aims to achieve measurable and predictable logistics performance across industry sectors, which is essential for economic growth at both macro and micro levels. The initiative focuses on strengthening logistics ecosystems and supply chains across key industries, including agriculture and food security. The ultimate goal is to ensure sustainable water, energy, and food security while promoting low-carbon and climate-resilient economies.

CSIR Smart Mobility cluster's RD&I responses for 2025/26:

- Several key RD&I initiatives aimed at advancing the transport sector include developing sustainable transport infrastructure to reduce costs and enhance resilience against climate change and optimising transport systems and operations to move towards smart cities and villages. This involves leveraging electric and hybrid vehicles, digital systems, AI and big data analytics.
- Additionally, the strategy focuses on enabling integrated logistics to support industrialisation and competitive trade by improving integration across road, rail, and ports and creating opportunities for SMMEs and job creation. Intelligent transport systems and operations will be enhanced through data science and service design standards, improving service delivery and asset management.
- Transport infrastructure engineering will develop sustainable and resilient infrastructure, improving the safety and efficiency of ports, roads, and rail.
- Finally, the national logistics system will be enhanced to support economic growth and job creation through end-to-end supply chain solutions and improved corridor performance. These initiatives aim to foster a robust R&D ecosystem, support sustainable and inclusive growth, and address the evolving needs of the transport sector.

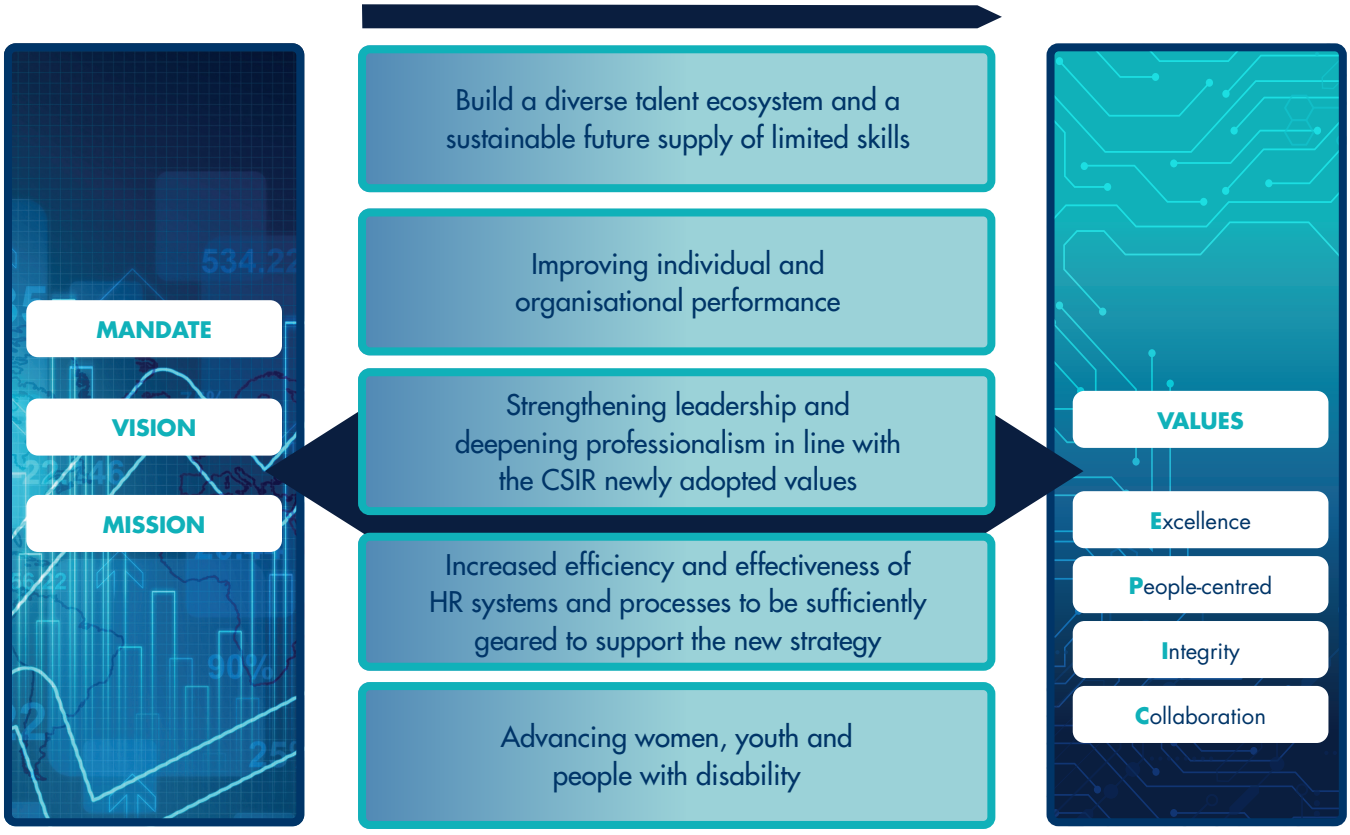
For more details, the cluster strategic responses are also depicted in Table A3 and specific projects that speak to these strategic initiatives are listed in Table B1 in the CSIR Annual Plan in Annexure B. These strategic responses speak to the three priorities of the MTDP, "A capable, Ethical and Developmental State", "Inclusive economic growth and job creation" and "Maintain and optimise the social wage." Moreover, these strategic initiatives support the ongoing ERRP and the Decadal Plan for STI policy implementation.

A.3.6.2 HUMAN CAPITAL DEVELOPMENT STRATEGY

The CSIR is pivotal in advancing national strategic objectives by investing in and developing a highly skilled HC workforce. Our commitment is to cultivate expertise that drives scientific research, innovation, and technology development, which is essential for addressing the country's socioeconomic challenges. Through these efforts, we contribute significantly to achieving national imperatives and fostering sustainable progress.

The CSIR ascribes to the call to build and strengthen SET human capabilities as outlined in the SDGs, the National Development Plan: A Vision for 2030; the Human Resource Development Strategy for South Africa 2010 – 2030; the DSTI's Human Capital Development Strategy for Research, Innovation and Scholarship of 2016. To optimise the above, the CSIR participated and contributed to the Decadal Plan objectives in November 2021. The CSIR strategy for 2025/26 – 2029/30 considers this context and aligns with the national policy on STI.

The CSIR has adopted five strategic pillars to achieve the CSIR SO4: Build and transform human capital and infrastructure. The five strategic pillars aim to align HC strategy and operational planning with the CSIR's new strategy, vision, mission and values and create synergy with HC functions and strategic leadership roles to achieve and implement cultural change initiatives. The diagram below shows the alignment between the five strategic pillars and the CSIR's mandate, mission, vision and values.



Building a diverse talent ecosystem and a sustainable future supply of limited skills

Building a diverse talent ecosystem is crucial for equipping the CSIR with highly skilled human capital, which is essential for driving organisational growth and ensuring long-term sustainability. This strategic approach will not only support the achievement of our strategic objectives and mandate but also elevate the CSIR's role and contributions towards advancing socioeconomic development and technological progress in the country and for its people.

The objective is to expand CSIR's talent ecosystem and ensure a sustainable supply of human resources that aligns with capacity and skill demands to meet the business objectives of the organisation. Key focus areas to achieve this goal include targeted talent acquisition and management, strategic workforce planning, pipeline development, organisational learning, Corporate Social Investment, an Alumni Programme and the enhancement of external partnerships.

Strengthening leadership and deepening professionalism

Our strategy to cultivate a motivated, high-performing, and diverse workforce is comprehensive and strategically focused. Central to this approach is a robust emphasis on leadership development and long-term career growth for our employees. We are committed to enhancing leadership and management capabilities through our Leadership and Management Development Programme (LMDP), designed to nurture both current leaders and high-potential talent.

To advance professionalism and align staff behaviours with our EPIC values, the CSIR is implementing targeted development initiatives and forging partnerships with industry experts. These programmes are aimed at strengthening key behavioural competencies, facilitating skill transfer and driving continuous professional growth. This multi-faceted strategy ensures we build a dynamic workforce equipped to excel in today's competitive environment.

Improving individual and organisational performance

Our objective is to elevate both individual and organisational performance by systematically pursuing excellence and fostering a high-performance and people-centric culture. This will involve a staged approach to address key areas for improvement and enhance our capabilities.

To achieve this, we will implement critical HC initiatives designed to boost operational efficiency and organisational performance. Key initiatives include embedding a compelling Employee Value Proposition to attract and retain top talent, enhancing performance management systems and increasing employee engagement and performance-based reward practices. These efforts are essential for driving sustained excellence and achieving our strategic goals.

Increased efficiency and effectiveness of HC systems and processes

The CSIR is dedicated to maximising efficiency and effectiveness by optimising its systems to boost productivity and enhance client impact. To support this, HC systems and processes remain a strategic priority essential for achieving our organisational objectives and initiatives. Key to our success is the standardisation and automation of processes, coupled with increased utilisation of our current systems. These improvements are crucial for elevating service delivery and driving greater effectiveness and efficiency within our Human Capital functions.

Advancing women, youth and people with disability

Engagement activities are central to the CSIR's mission, with several key initiatives, including the Women's Forum and the Youth Forum, designed to drive impactful change. The Women's Forum plays a crucial role in empowering women, particularly in traditionally male-dominated fields. It focuses on providing solutions with women at the forefront, championing their development and leadership. In addition, the advancement of women is prioritised through recruitment planning that is aligned with the Employment Equity Plan (EEP) of the CSIR.

The Youth Forum initiatives further emphasise the role the youth play in contributing to and influencing the strategic future of the CSIR. The forum creates space for networking and collaboration amongst young professionals while also contributing towards building a vibrant and inclusive organisational culture within the CSIR. The advancement of people with disabilities is also a key focus for the CSIR. As of 31 March 2024, the CSIR employed 60 staff members with disabilities, constituting 2.6% of the total staff. This is 0.6% above the minimum target of 2% as determined by the Department of Employment and Labour.

A.3.6.3 RESEARCH INFRASTRUCTURE INVESTMENTS

Research infrastructure is a key component of achieving the strategic objectives of the CSIR. Therefore, there is a need to renew the CSIR's infrastructure to achieve its strategic objectives.

The investments in infrastructure aim to create a robust and sustainable infrastructure that supports the CSIR's strategic goals. By ensuring compliance, enhancing safety, maintaining business continuity, and optimising resources, these investments are essential to provide a foundation for advancing research and development activities. This holistic approach not only safeguards current projects but also positions the CSIR for future growth and innovation.

The current portfolio of infrastructure investments (NEP applications/submissions yet to be confirmed for implementation in 2025/26) include:

- Self-funded Capital infrastructure investment (R100 m);
- National Treasury-funded projects (R185 m); and
- NRF national equipment programme (R18 m).

The planned investment is short of the billion rand investment required to address critical infrastructure requirements. The planned portfolio of investments seeks to align with the CSIR's strategic goals, ensuring that the limited resources are used effectively to support growth, relevance, impact, and sustainability in the best way possible given the severe shortage of infrastructure investment. The support for R&D means that upgraded and well-maintained infrastructure provides a conducive environment for cutting-edge research and innovation, enhancing the CSIR's ability to contribute to technological advancements and achieve its mandate.

In support of these aspirations, effective governance and risk management practices are in place to ensure that infrastructure investments are financially viable and strategically aligned, minimising risks associated with significant capital expenditures.

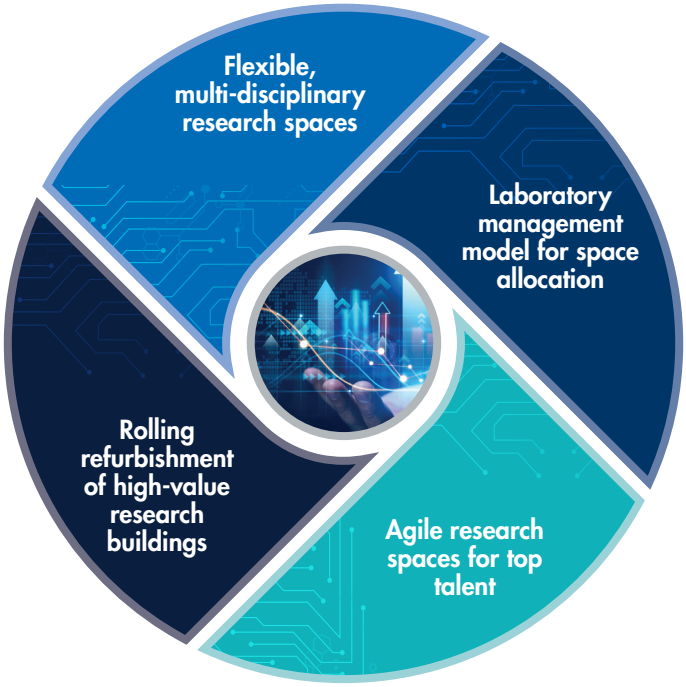
Self-funded capital infrastructure investment

Over the 2023-2024 financial cycle, the CSIR has invested approximately R100 million in capital infrastructure from its own reserves. The key areas of investment seek to enable and address priorities of health and safety, business continuity, revenue generation, ICT, and sustainability. Through a planning mechanism that identifies capital improvements and investments in each financial year, the CSIR consolidates the organisation's infrastructure priorities and financial resources to enable the CSIR to make decisions in the short term.

Going forward, the CSIR has developed a 10-year plan to guide its investment approach to address future facility and infrastructure requirements. The plan outlines a proposed facilities and estate investment programme to support the CSIR's

strategic plan and optimise spending within the available funding. The initial assessment of the implementation of the plan indicates an investment requirement of R1.4 billion. These requirements will be prioritised against:

- Infrastructure for projected growth;
- Maintenance of competitive market position;
- Maintenance of current operations and staff safety; and
- Refurbishment and adaptive reuse of building.



This plan is a living document guiding CSIR's infrastructure investments to support its strategic vision, ensuring flexibility to adapt to emerging needs and priorities over the next decade.

National Treasury-funded projects

The National Treasury (NT), through DSTI, approved funding for the establishment of strategic research infrastructure at the CSIR for upgrades and or enhancement of capability to existing infrastructure. The programme, ending on 31 March 2025, with a value of R185 million, includes (a) an open innovation laboratory to support active pharmaceutical ingredient manufacturing, (b) the learning factory, (c) the road materials testing laboratory and (d) the port model hall. Proposals for new infrastructure programmes for 2025/26-2027/26 are being conceptualised by clusters.

National Research Foundation National Equipment Programme

The National Research Foundation National Equipment Programme (NEP) makes funds available to support the acquisition, upgrade or development of state-of-the-art research equipment through a competitive peer review process. This involves major items of equipment that support multi-disciplinary and inter-disciplinary research and usually requires significant capital investment. This infrastructure investment vehicle allows for the inclusion of specialist operators and dedicated personnel that are required to operate and maintain such instrumentation to be funded.

The CSIR has submitted to the NRF for consideration support of infrastructure projects to the value of R18 million for implementation in 2025/26. The final funding decision has yet to be made.

A.3.6.4 CAPABILITY DEVELOPMENT

As part of implementing the CSIR strategy since 2019/20, the strategic and centrally funded initiatives were implemented to support the organisation's intent of growth and sustainability and to ensure the relevance of CSIR RD&I through the involvement of industry, state-owned enterprises, government, and other innovation partners in the NSI.

Furthermore, these initiatives sought to contribute to the development of a well-defined value proposition for higher impact. Since its inception in 2019/20, the CSIR has invested R157 million and an additional R3.5 million leveraged from the DSTI in thirteen (13) initiatives. Of these, nine initiatives have been completed with ongoing initiatives in (i) the DigiBioBank, (ii) FuturePharma, (iii) Aquaculture and (iv) Mining Modernisation.

These initiatives are collaboration initiatives that improve the competitiveness of high-impact industries to support South Africa's re-industrialisation. The investment has been strategically deployed to these critical projects as they have shown the highest potential to derive maximum impact in line with the CSIR strategic intent.

To enable CSIR to maintain these initiatives, securing government funding through a Parliamentary Grant ensures continuous support for CSIR's research projects. The current allocation of the CSIR's PG poses a risk to the capacity of the organisation to maintain these strategic investments. Over the 2025 MTEF, the CSIR will not be able to invest in new capabilities or maintain existing ones. This poses a major risk to the strategic thrust of the organisation. There is a drive for private sector investments wherein collaborations with private sector companies provide additional funding and resources, enhancing CSIR's research capabilities.

DigiBioBank

The Digital Biobank project is advancing towards commercial development, focusing on optimising multiomics datasets for colorectal cancer and liver disease. Key activities include launching a pilot for the DigiBiobank and developing a sustainable business model. Partnerships with GenenTech (USA) and Wits Donald Gordon Medical Centre (WDGMC) are crucial to this effort. With the base capability established, the final year of funding aims to create a minimum viable product for piloting.

FuturePharma

South Africa's healthcare system is heavily reliant on public services, yet only a small fraction of pharmaceutical funding goes to this sector, leading to drug shortages and poor-quality medicines. The country depends on imported drugs, creating supply risks and trade deficits. Efforts to boost local drug production are underway, including the National Health Insurance Bill and increased government investment. However, drug shortages still impact patients, especially the poor, who struggle with repeated clinic visits.

To address this, the government is focusing on local Active Pharmaceuticals Ingredients (API) production, supported by strategic initiatives. The Technology Innovation Agency (TIA) has established an API cluster to develop and commercialise API manufacturing, leveraging local skills and facilities. A three-year budget of R 28.615 million aims to establish expertise in API process development, enhance industry-academia collaboration, and build a business case for full-scale local API manufacturing. The CSIR has been identified as a host to the current phase of this platform and the finalisation of contracting is scheduled for the end of December 2024.

The main output from the platform should be cost-competitive and improved processes for the synthesis of small molecule and biopharmaceutical APIs of African relevance that can be scaled up for commercial production. The utilisation of new biocatalytic, flow, and immobilised catalyst technologies that encompass green principles, such as incorporating "fewer" toxic materials, waste reduction and increased efficiency, will be employed to synthesise small molecule APIs using a hybrid batch-flow-biocatalytic approach.

Aquaculture

The successful development of molecular diagnostic assays for TiLV and ISKNV has established CSIR's credibility in supporting the African aquaculture industry. This success secured additional funding from TIA to expand diagnostics technology to five countries and fostered collaborations with international organisations like the Food and Agriculture Organisation and CEFAS. Locally, these technologies have been crucial for the Biosecurity Innovation Hub, enhancing state capabilities in monitoring and surveillance. The completion of the initial phase of the initiative was a major milestone, leading to Capability Development funding for the current phase, which focuses on broader aquaculture diagnostics, feed and health programmes.

This current phase addresses infectious diseases, point-of-care diagnostics, and the lack of vaccines, therapeutics and diagnostics support. The initiative aims to establish CSIR as a leading technology development organisation for aquaculture in Africa. This current investment focuses on disease diagnostics, vaccines, therapeutics, and novel probiotics. The value propositions include expanding diagnostics capabilities, developing novel vaccines, and implementing high-quality, cost-effective in-feed additives. These efforts will improve diagnostics, reduce disease burdens, and enhance productivity and environmental sustainability in aquaculture. The initiative also aims to expand CSIR's animal probiotic portfolio and support skill development through R&D activities and training programmes.

Mining modernisation

The digital twin modelling for Trackless Mobile Machinery (TMM) collision prevention systems has been developed by the CSIR in collaboration with industry partners in a timeframe of approximately 24 months from concept to operational pilot and commercialisation is planned in the next 12 months. The project has successfully demonstrated the use of digital twinning technology as a decision support tool to enhance safety, productivity, and cost-efficiency in mining operations. The core capabilities of the technology focus on driver fatigue monitoring, driver behaviour analysis, pedestrian movement tracking and the development of a decarbonisation module. These efforts aim to improve safety by identifying unsafe driving behaviours, optimising pedestrian movement tracking, and assisting in the selection of appropriate decarbonisation technologies. The technical capabilities of the technology encompass data analytics for causal analysis, pedestrian movement modules, and decarbonisation tools. The project also aims to develop skills in digital modelling, data analytics, systems engineering and AI. Through the investment made, a pilot study with Exxaro Grootegeluk Coal Mine and data integration with Afrimat have been completed and a commercial version of the product is currently being conceptualised by industry partners.

Precision Agriculture Information System

The initial overarching aim of the project was to develop a unique precision agriculture information system for maize. The precision agriculture information system (PAIS) aims to provide regular farm-level information (actionable data) on the spatial variability of crop growth conditions to foster precision farming and supply chain management decisions at all levels of the agriculture value chain (from farm-to-fork). Thus, the main product to be commercialised is precision agriculture data or information accessed via the IoT on desktop and mobile platforms. The World Economic Forum estimates the total value that precision agriculture services can bring to the agriculture industry in South Africa at R205 billion by 2026.

PAIS has seen significant progress and adoption. The Department of Agriculture, Land Reform and Rural Development (DALRRD) has integrated PAIS into its extension services, with follow-up service level agreements planned for the next financial year by the CSIR Advanced Agriculture and Food cluster's Business Development and Commercialisation (BD&C). A Memorandum of Understanding (MoU) has been signed with NWK Limited, a leading agricultural cooperative in the North West Province, to pilot PAIS, with hopes to convert the MoU into a Memorandum of Agreement (MoA) next year. DALRRD and DSTI have agreed to fund a R2.5 million pilot study for PAIS implementation in the Eastern Cape. Additionally, a R4 million contract agreement with the Namibian Agronomic Board for a PAIS pilot in Namibia is in its final stages.

The Civil Aviation Requirements for the drone have been completed, attracting a R1 million project funded by Armscor via the CSIR Defence and Security cluster. The development of PAIS 2.0 is ongoing, and the platform has been launched on a national platform during the National Space Conference.

Digital twin for trackless mobile machinery

Since its inception, the CSIR has leveraged a total funding of R11 million, including R3.5 million from the Mandela Mining Precinct (MMP). In the pipeline development and business activities, Afrimat is in the contracting phase and Fraser Alexander (FA) has developed a proof-of-concept (PoC) and is planning its demonstration. The team is preparing documentation for TLIU to fund a minimum viable product for the Sector Wide Technology Access Programme (SWTAP). Potential projects with the Minerals Council include an industry-wide TMM regulations implementation dashboard and continuous noise monitoring applications. Partnerships have been formed internally with the CSIR Future Production: Manufacturing cluster and externally with the Minerals Council and its members. The technology demonstrated at Grootegeluk mine has attracted interest from several industry operators, and the team is pursuing the SWTAP with TLIU as a precursor to commercialisation.

Research centres

In addition to these critical projects, the CSIR has continued to invest in research centres in the areas of synthetic biology, cybersecurity, robotics and future production, water research, emerging digital technologies for the 4IR, nanomaterials and advanced materials. With respect to the research centre investments, which aim to enhance research and technology in specific areas, consolidated and further developed into deep world-class capability to support multiple areas of application across the organisation. CSIR has invested R225 million from 2019/20 in the following areas:

CSIR Centre for Emerging Digital Technologies for the Fourth Industrial Revolution focuses on four advanced technology themes: (i) Advanced IoT - which involves developing full IoT solutions from edge devices to cloud systems to enhance security (ii) Artificial Intelligence (AI) - which uses AI methodologies for data prediction and classification to improve decision-making; Extended Reality - which creates competitive advantages through 3D modelling to accelerate human-computer interaction; and (iv) Distributed Ledger Technology - which develops decentralised applications to increase efficiency, reduce transaction costs, and enhance security verification. The research centre's competitive edge lies in de-risking 4IR investments for South African organisations by conducting valuable research and creating technology blocks for adoption by government and industry.

The Information and Cybersecurity Research Centre focuses on three main areas: research and innovation, capacity building, and support services. It aims to develop solutions for identity management and cybersecurity, addressing vulnerabilities and threats to protect both physical and digital systems. The research centre also emphasises building advanced capabilities for managing risks and threats, particularly for institutions and individuals. Additionally, it provides support services for national enforcement and data protection.

The Water Research Centre focuses on three main areas: Smart Water Use, Smart Water Infrastructure, and Smart Water Analytics and Services. In Smart Water Use, the Centre provides specialised water quality analysis, addressing issues like ecotoxicity, emerging pollutants, and nature-based treatment alternatives. Smart Water Infrastructure emphasises continuous improvement and support, including training on wastewater treatment products and alternative energy solutions for treatment plants. Lastly, Smart Water Analytics and Services involve groundwater resource assessment, surface water monitoring, and hydrological modelling, with a focus on agricultural water use efficiency. This comprehensive approach aims to manage water resources efficiently through innovative methods of usage, infrastructure and analytics.

The centre faced significant financial challenges, reporting substantial losses that impacted the overall financial health of the Smart Places cluster. Additionally, the centre struggled with maintaining and upgrading water infrastructure to ensure

availability and affordability. Developing and implementing new water management technologies required substantial investment and collaboration, adding to the financial strain. Engaging with a wide range of stakeholders, including government departments and industry partners, was essential but challenging, requiring effective collaboration and strategic partnerships. Despite these hurdles, the centre made notable contributions to water management practices and technological innovations.

The Centre for Robotics and Future Production focuses on four key areas (i) Artificial Intelligence (AI) and Robotics (ii) Machine Vision, (iii) Future Production Systems and (iv) Manufacturing Execution Systems. In AI and Robotics, the centre emphasises 3D mapping, situational awareness using LIDAR and automation, along with assessments related to the 4IR. Machine Vision is dedicated to quality control, anomaly detection and post-estimation techniques. Future Production Systems explore machine intelligence and the application of large language models. Manufacturing Execution Systems concentrate on monitoring manufacturing processes from raw materials to finished products. Overall, the research centre aims to develop innovative products and systems by conducting needs analysis and staying updated with industry advancements.

The Centre for Nanostructure and Advanced Materials focuses on three primary research areas: (i) Advanced Functional Materials, (ii) Polymer Nanocomposites and (iii) Characterisation and Imaging. In the realm of Advanced Functional Materials, the Centre explores biodegradable polymers and materials for pharmaceuticals, packaging, and biomedical applications, aiming to support industrialisation and create eco-friendly alternatives. The Polymer Nanocomposites section is dedicated to enhancing the properties of bulk materials, such as thermal resistance and fire retardancy, with applications in automotive, aerospace and other sectors. Lastly, the characterisation and imaging area employs a wide range of advanced instrumentation techniques, including high-resolution transmission electron microscopy, atomic force microscopy and various spectroscopy methods, to analyse and understand nanomaterials. The Centre's competitive edge lies in its advanced research capabilities, innovative approach to materials science, and commitment to sustainability.

The Synthetic Biology Research Centre focuses on (i) Bioengineering and Genomics for the African microbiome research to understand its impact on precision medicine, digital precision medicine, genome engineering, and stem cell bioengineering to improve treatment outcomes. The Synthetic Nanobiotechnology capability highlights the development of synthetic biological systems for industrial applications and novel metabolic biosystems through systems biology. The Precision Medicine's expertise emphasises cancer precision medicine, including drug sensitivity screening platforms using synthetic biology and innovations in synthetic biology for viral hepatitis prevention. Additionally, the Centre is noted for being the first in the country to establish NRF Research in Innovative Synthetic Biology, positioning itself at the forefront of translational research with hospitals on bioengineered livers and drug sensitivity tests. With the collaboration and support from the DSTI, the centre is revising the National Biodesign Framework, which is pivotal to the renewal of the centre's strategy.

The Energy Research Centre focuses on four main areas: Energy Supply and Demand, Electro-Chemical Technologies, Energy Systems, and Energy Industry. In Energy Supply and Demand, the Centre provides specialised research in energy efficiency and demand shaping, renewable energy technologies, and hydrogen techno-economics. Electro-Chemical Energy Technologies emphasises the technological development of lithium-ion batteries focusing on anode and cathode active material, fuel cells to support the hydrogen economy and super capacitors. Energy Systems focuses on a systems approach to long-term energy planning, grid planning, microgrids and energy system design and operation. Lastly, the Energy Industry is an end-user-focused research group which supports industrialisation through socioeconomic assessment and techno-economic analysis and provides SMME development in the pursuit to support the Just Energy Transition. The Energy Centre provides fact-based expertise and essential research infrastructure necessary to address South Africa's growing energy needs, as well as the associated industrialisation opportunities for new products and services. The Centre's growth and impact plan responds directly to the challenges identified in the National Development Plan (NDP) by providing unbiased decision support to solve long-term sustainable energy needs of South Africa while concurrently addressing issues such as carbon dioxide emissions, water use, uncertainty, localisation and regional development.

The Photonics Centre focuses on five main areas: Laser Enabled Manufacturing, Novel Laser System development, Laser Engineering Services, Biophotonics and National Programmes that support photonics and additive manufacturing technology development nationally. The centre develops novel photonics and laser technologies, processes, products and services that serve a wide range of industries. High-power laser processing of metals with custom-built machinery is one of the core offerings of the centre. Teams develop laser cladding, additive manufacturing and laser shock processing systems and then do extensive application R&D to apply them for end users in heavy and advanced industries such as energy generation, petrochemical refining, mining equipment and aerospace part manufacturing. Core research focuses on innovation in machine development, motion control, laser and laser beam delivery systems, process monitoring, and novel metal alloys, all of which are driven by end-user requirements. The research outputs are implemented by teams that offer high-power laser processing services to clients, the majority of which are for entities such as Eskom and Sasol. Work is also contracted through strategic partner relationships with MAN Energy Solutions and ACTOM Metalplus, among others. Teams also develop novel photonic biosensors to detect a range of diseases such as HIV and TB, cost-effectively at the point of care, as well as other advanced medical equipment and medical device manufacturing processes. The centre also hosts a range of photonic and manufacturing programmes to support research and education at higher learning institutions across South Africa and the wider African continent.

A.3.6.5 ENABLING SUPPORT FUNCTIONS

As in any large organisation, the CSIR has several support functions that are key to the delivery of the organisational strategy through central coordination of various activities such as RD&I management, intellectual property management, ICT support, legal support, financial management support, supply chain management, human capital management, corporate communications, etc. With the increasing compliance requirements associated with the entity, as well as the complex operations of a large multi-disciplinary organisation, a well-capacitated support portfolio is critical to enable the operations of the CSIR. The ongoing reduction of Parliamentary Grant reduces the ability of the organisation to cover the costs associated with a fit-for-purpose support function, including its capacity as well as the ICT systems required to enable much-needed automation to increase efficiencies.

Business Excellence and Integration

The Business Excellence and Integration portfolio has made significant strides in nurturing the various functions that support the organisation's RD&I elements, including the management and oversight of the organisation's RD&I investment, research ethics compliance, IP and technology transfer management, institutional planning monitoring and evaluation, the provision of information services as well as the management of strategic partnerships on behalf of the CSIR. The function has matured, overcoming some of the key capacity challenges in the last five years, with the main focus for the upcoming year on capacitating the remaining key functions, the institutionalisation of innovation management and governance processes, acquisition of a portfolio management system, refinement of processes and protocols with its commercialisation vehicle and rollout of its Africa strategy.

Finance, ICT and Strategic Procurement

The Financial Services portfolio has made significant strides in enhancing the CSIR's financial sustainability and governance. Key achievements include improved debt collection processes, resulting in a reduction of overdue debt to 3.65% of external income and maintaining a clean audit outcome. The portfolio has also successfully implemented various digital transformation initiatives, such as migrating to SharePoint and developing a mobile asset management framework. However, challenges remain, particularly in addressing critical vacancies and overcoming budget constraints that hinder system upgrades and full automation.

The Strategic Procurement Unit (SPU) has progressed towards a more efficient and effective procurement process, achieving a high performance in contract management and supplier relationships. Notable achievements include the implementation of 39 strategic supply contracts and maintaining a Level 1 B-BBEE contributor status. The SPU has also automated several procurement templates and developed a tender submission portal. Despite these successes, the unit faces challenges in resource constraints and the need for further automation and integration of procurement systems to enhance efficiency.

The Information and Communication Technology (ICT) department has advanced its digital transformation agenda, moving from an "aspirational" to an "emerging" stage of excellence. Key achievements include the successful migration to Microsoft services, network upgrades, and the implementation of full disk encryption to enhance cybersecurity. The ICT department has also improved infrastructure stability and service delivery. However, challenges such as funding limitations, staff restructuring and the need for better ICT governance continue to impede further progress.

Human Capital

The Human Capital portfolio has made significant strides in building and transforming the organisation's human capital profile to meet strategic objectives. Key achievements include a total staff growth of 8%, with a notable 17.4% increase in SET staff and an 11% decrease in support staff. The representation of black South Africans increased by 7%, and female representation grew by 1%, with a remarkable 56% increase in black South African females in SET positions. Additionally, the intake for pipeline programmes nearly doubled, with significant increases in Graduate-in-Training and YES programme participants. Permanent appointments more than doubled, while permanent exits decreased by approximately half, resulting in a 5.7% decrease in the attrition rate.

The portfolio also introduced new policies and updated existing ones, completed the PeopleSoft upgrade, and automated several processes. Employee engagement and wellness were prioritised through climate surveys and wellness programmes focusing on mental health and wellbeing. Career development saw the promotion of several chief and principal researchers and the introduction of new career ladders. Corporate social investment efforts included adopting seven schools and reaching over 10 000 students through various outreach programmes.

Legal, Compliance and Business Enablement

The Legal, Compliance, and Business Enablement portfolio has made significant strides over the past five years. One of the major achievements includes the successful restructuring and stabilisation of the portfolio, which initially struggled with missing key performance indicators and supporting organisational objectives. The Conferencing and Accommodation group, particularly the CSIR International Convention Centre (ICC), demonstrated remarkable resilience by recovering from significant financial losses due to the Covid-19 pandemic and regaining its market share. Additionally, the Enterprise Risk Services team has grown in size and capability, embedding a matured enterprise risk model that is now integral to all business operations, enhancing organisational sustainability.

The Legal and Compliance teams have undergone a significant transformation, stepping up to meet organisational demands and providing full partnership support to business operations. They have successfully minimised risks and achieved blanket certification for the CSIR against international standards like ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018.

Strategic Communication

The Strategic Communication portfolio developed its Marketing and Communication Strategy in October 2020. This strategy aimed to enhance visibility and brand reputation, attract RD&I business, promote CSIR as an employer of choice, engage employees and spearhead science engagement. Key achievements include significant increases in followers and engagement across various social media platforms, media training for more than 200 researchers and achieving a high Advertising Value Equivalent (AVE) through notable campaigns.

The CSIR also hosted successful events such as the 75th anniversary online conference in 2020 and the 8th Biennial CSIR Conference in 2022. The organisation also introduced a new logo and positioning statement, "Touching lives through innovation," in 2020, reflecting the balance between science and industrial development. The CSIR C^3 commercialisation vehicle was launched in October 2023, securing significant media coverage. Additionally, the CSIR participated in various industry events, enhancing visibility and engagement. The CSIR also enhanced internal communication and employee engagement through various initiatives, participated in numerous outreach activities and received multiple awards for its publications and media campaigns.

CSIR C^3

CSIR C^3 (pronounced CSIR C-Cubed) is a specialised stand-alone technology commercialisation vehicle wholly owned by the Council for Scientific and Industrial Research (CSIR) in South Africa. Its primary purpose is to accelerate the commercialisation and industrialisation of technologies and intellectual property (IP) developed by the CSIR.

Key Functions of CSIR C^3:

- **Commercialisation of technologies:** CSIR C^3 focuses on transforming CSIR's research and innovations into market-ready products and services;
- **Investment and funding:** It secures funding and investments to support the commercialisation process, including co-investments from venture capital firms and private equity partners;
- **Strategic partnerships:** CSIR C^3 forges partnerships with industry stakeholders, government bodies, and international investors to facilitate market access and commercialisation opportunities;
- **Support for startups:** The entity provides technical support, business mentorship, and market access to high-tech startups, helping them scale and achieve commercial success; and
- **Operational efficiency:** It aims to streamline operations and reduce investment processing times to enhance the efficiency of the commercialisation process.

CSIR C^3 Goals:

- **Economic and societal impact:** By commercialising CSIR-developed technologies, CSIR C^3 aims to drive economic growth and societal benefits in South Africa; and
- **Innovation ecosystem:** It seeks to create a thriving innovation ecosystem by bridging the gap between research and market.

The strategic initiatives for C^3 are listed in Table A4 (page 95).

A.3.6.6 DRIVERS OF SUCCESSFUL STRATEGY IMPLEMENTATION

The drivers of CSIR Strategy implementation essentially encompass elements that speak to financial and income diversification strategy.

Business Development and Commercialisation

The evolution of the business development and commercialisation function

The BD&C function, having three divisional offices, serves as a vital bridge between R&D and the marketplace. Its role, driven by the organisation's strategic objectives, is specifically aimed at translating research into tangible socioeconomic outcomes. It is thus responsible for several functions, including growing contract R&D income and diversifying revenue streams, driving the commercialisation of specific technologies, securing funding and strategic partnerships for market entry and supporting clusters to ensure their R&D strategies are market-aligned.

Formally initiated in 2020/21, the BD&C function is still in its nascent stages, straddling the "norming and performing" phases of its development. While facing challenges such as capacity constraints and the need for deeper integration of specialised skills within clusters, the function has already demonstrated achievements. These include enhanced negotiation of complex, large-scale contracts, increased cluster awareness of and engagement with industry needs and expansion of international funding streams and/or market reach.

Given the CSIR's wide range of technologies and the idiosyncrasies of the clusters, each BD&C office adopts a bespoke approach. For some clusters, the BD&C focus has been on partnerships to de-risk IP development and ensure market readiness. For others, it has been about supply-side interventions to stimulate further development and partnerships, maturing technologies, and developing new market-relevant innovations. These strategies will continue to change in response to the dynamic landscape of the CSIR.

Overall, despite its infancy, the BD&C function is actively progressing and some of its achievements demonstrate a promising trajectory.

The CSIR **Advanced Chemistry and Life Sciences division** has formulated a business development and commercialisation strategy that is centred around Growing its private sector reach, continuous Research for industry insights and alignment, Opening the CSIR to the global community and ensuring that we Work collaboratively (Grow Strategy) within and outside the division. This approach, together with an optimised internal working ecosystem, will ensure that the division is well aligned to realise the desired growth and revenue diversification plan enshrined in the organisation's strategic objectives.

The BD&C strategy for CSIR Advanced Agriculture and Food cluster focuses on increasing visibility through associations like Agbiz, PotatoSA and GrainSA to foster more private-sector partnerships. It also looks at expanding its service portfolio, e.g., PAIS as a predictive tool for the banking sector and commodity associations, as well as analytical testing in the food and animal sectors, driven by Milk SA and SAGRA. AAF will be positioned as a technical partner for CSI initiatives led by organisations like First Rand Foundation which have a great interest in agroprocessing for enterprise development and job creation.

Internationally, CSIR Advanced Agriculture and Food cluster will form long-term strategic partnerships, including the UK Government's CEFAS and One Food, for multi-year high-impact projects. Future Production Chemicals (FPC) strategy includes value enhancement through partnerships with other clusters, such as Water and Energy, which complement FPC's biorefinery facilities (biomass to activated carbon for water purification and biomass to biogas for household energy). It involves strategic positioning of FPC as a technical partner in regional emerging opportunities driven by the private sector, such as alien invasive species valorisation (KZN, EC), personal care skills and products for enterprise development (Gauteng). Strategic partnerships with consulting firms that offer business coaching and market access for enterprise development will

be fostered where CSIR is ineligible for direct funding but can be a technical partner. This includes joint initiatives with NPOs that can offer Enterprise Development tax incentives, as with a recent project concluded with the Nedbank Foundation. Platforms such as Halo Science, which advertise private sector challenges to solicit solutions, form part of FPC's strategy for reach and alignment to global industry needs. For Next Generation Health (NGH), the strategy includes growing public sector collaborations (currently non-existent) through multi-year programmes with entities like the DSTI, TIA and DoH. NGH's capabilities will further be positioned for co-development partnerships with private sector companies, including Life-Assay, Thermo Fisher Scientific and Ampath. Opportunities also exist with NGOs and NPOs like the Aurum Institute and SANAC for diagnostics in HIV/AIDS and diabetes. Private clinical trial facilities (e.g., CRISMO, Farmovs) are strategic partners for pre-clinical screening funding opportunities. Responding to global funding calls for pandemics, including mPox through SAMRC, The World Bank, and Africa CDC, is core to international sector income diversification. A consortium approach for joint funding initiatives from GIZ, USAID and WHO further adds to this. NGH's Synthetic Biology platform, in collaboration with DSTI, will aim to secure a multi-year programme after a successful workshop for a national framework development towards industry-led growth.

ACLS has refined its commercialisation strategy over the past five years to increase revenue, including up-front licence fees for new licences and close monitoring of existing licences for royalty payments. New licences, such as those with OptimusBio, Kiara Health, and Mycosure, have secured upfront payments. Non-performers will face conversion from exclusive to non-exclusive status, and patent infringers will be addressed legally. Technologies like PAIS, Bioplastics and the Animal Health Vaccine are prioritised for licencing, with CSIR C^3 playing a key role in channelling SMMEs and technologies for commercialisation. Demonstration trials will further help prove concepts and unlock licencing opportunities. Overall, ACLS has a strong pipeline that supports this strategy and is on track to realise these opportunities soon. Contract R&D revenue is thus projected to grow from R340 million (FY25/26) to R474 million by 2030, with BD&C's contribution increasing steadily from 8-30% by 2030. Commercialisation revenue is expected to reach R19 million by 2030, from the current R2 million projected in FY25/26.

The CSIR **Advanced Production and Security division** has developed a comprehensive strategy to engage with the private sector and enhance its impact on industry. The strategy includes several key elements aimed at strengthening the division's capabilities and increasing its market uptake. The BD&C Office plays a central role in packaging deals, managing contractual risks and ensuring smooth operations. This office is crucial in de-risking projects, supporting joint technology development and institutionalising business development processes.

The strategy also includes cluster-specific approaches for different sectors. For the CSIR Defence and Security cluster, the focus is on mature technologies ready for commercialisation, with interventions to stimulate industry uptake and mobilise funding and partnerships. The CSIR Future Production: Manufacturing cluster has a pipeline at varying levels of maturity, with supply-side interventions to develop market-relevant technologies. The CSIR Future Production: Mining cluster aims to ramp up capabilities to mature offerings and assist in navigating partnerships to de-risk IP development.

Strategic positioning and stakeholder engagement are also critical components of the strategy. This involves developing roadmaps and industry-focused strategies for target industries, with high-level engagements by senior executives to build relationships with key stakeholders such as DSTI, DoD, Armscor, MHSC and DMRE. Stakeholder relations managers are implemented to improve the effectiveness of managing stakeholders.

Cross-cluster initiatives are another important aspect of the strategy. These include collaborations between the Manufacturing and Defence and Security clusters for efficient manufacturing of systems, the development of automation for trackless mobile machinery, and real-time information systems for mining and manufacturing. The strategy also expands cybersecurity activities to include applications in mining and manufacturing.

Finally, the strategy focuses on enhancing efficiency and effectiveness within the Advanced Production and Security division. This includes embedding support staff within clusters to improve financial management, contract management, and operational efficiency. The development of commercialisation models to respond quickly to industrialisation requirements, improved project management methodologies, and future strategic responses for 2024-2029 are also part of the strategy. These future responses aim to enhance technology development capabilities, improve RD&I management, increase commercialisation capabilities and continue supporting existing industry support programmes.

The CSIR **Smart Society division** has developed a comprehensive strategy to engage with the private sector and enhance its impact on industry. The strategy includes several key elements aimed at driving growth and innovation. The BD&C function focuses on growing contract R&D income, diversifying income streams, strengthening stakeholder engagement, and driving the commercialisation of innovations. The division has already experienced a 37% growth in contract R&D income, reducing reliance on the Parliamentary Grant from 23% to 17%.

Market positioning and stakeholder engagement are also crucial components of the strategy. The division engages with various government departments and state-owned entities to support the creation of a capable state. Additionally, it expands engagement with private sector clients, including AECI, Exxaro, Anglo American and ABSA. Strategic partnerships with international organisations like the United Nations Development Programme (UNDP), African Union and GIZ, as well as participation in international consortia, further enhance the division's market positioning.

Commercialisation and innovation are at the heart of the strategy. The division focuses on thorough market potential analysis before filing patents to ensure higher uptake and commercialisation success. Several patents have been filed, and multiple licence agreements have been signed. Despite challenges, the division has increased its royalty income through diligent monitoring and enforcement of licence agreements.

The strategy also includes the development of Strategic Priority Programmes (SPPs) that offer integrated end-to-end solutions addressing complex socioeconomic problems. These programmes promote collaboration across research groups, impact areas, clusters and divisions. Examples of SPPs include Human Settlements, Utilities and Services, Industrial Revitalisation Programme, Smart Government Services, Sustainable Transport Infrastructure and Enabling Integrated Logistics.

Finally, the strategy emphasises efficiency and effectiveness through embedded support functions, improved project management methodologies, and adherence to safety standards. The division has achieved a 27% increase in total revenue, reaching R1.17 billion in 2023/24, with significant growth in international sector income. Key achievements include contributions to sustainable smart living, economic development, and capacity building through e-government, policy advisory, and cyber-infrastructure for R&D institutions.

Driving innovation: CSIR's comprehensive approach to technology commercialisation and social impact

The Council for Scientific and Industrial Research (CSIR) recognises that effective commercialisation of its technologies is fundamental to achieving lasting societal and economic impact as well as creating a sustainable organisation. To this end, the organisation has developed a comprehensive and adaptable approach, encompassing various pathways and strategies designed to bring its technologies to market. This multi-faceted approach, supported by several dedicated functions both internal and external to the organisation, stems from the recognition that each technology demands a tailored strategy to achieve genuine impact.

The CSIR thus meticulously assesses factors such as the technology's developmental stage, potential applications, market dynamics, and societal benefit (among other factors). This comprehensive analysis, directed by the organisation's framework of enabling policies and strategies and guided by prevailing national priorities, informs the choice of commercialisation pathway.

While licencing remains a favoured route, the CSIR actively champions the creation of new ventures through spinouts or startups to drive innovation and economic growth. Furthermore, when making technology transfer and licensee selection decisions, the CSIR prioritises transferring technologies to Broad-Based Black Economic Empowerment (B-BBEE) entities, to small enterprises, to those who significantly contributed to the research and development leading to the intellectual property, and to those individuals or organisations committed to using the technology for the benefit of South Africa. The overarching goal is to maximise the technology's positive impact on South Africa.

To accelerate and scale its commercialisation endeavours, the CSIR recently launched CSIR C^3, a fully CSIR-owned but standalone enterprise dedicated to driving CSIR's technology commercialisation. CSIR C^3 is intended to provide financial resources, technical support, and an incubator environment for start-ups, enabling the translation of CSIR's intellectual property into impactful ventures. By fostering collaboration with investors, entrepreneurs, and innovators, CSIR C^3 will play a pivotal role in catalysing the re-industrialisation of South Africa through the establishment of new technology-based enterprises.

Through this multi-pronged approach, the CSIR is poised to ensure that its technological advancements yield profound social and economic benefits for South Africa.

Driving inclusive social innovation

The CSIR's role in "grassroots innovation" focuses on de-risking and scaling the various capabilities and technologies for the benefit of communities. The CSIR strategy achieves this primarily in partnership with the public sector, private sector and various actors in the social economy, including but not limited to NGOs, community-based organisations, foundations, social investors, government departments and entities, provincial development corporations, SEZs and academic institutions to enhance the pace and scale of development. These include targeted social entrepreneurship programmes to beneficiate indigenous plants (essential oils, cosmetics, etc), product development for SMMEs through the Biomanufacturing Industry Development Centre, the development and nationwide rollout of ventilators, rollout of ICT labs and computer systems to communities as well as environmental asset protection in the Kruger Park.

The current CSIR portfolio (Table A1) includes a range of technologies that require significant investment, de-risking and scale-up. The pace of scale-up is largely dependent on funding and with the decline in baseline funding over the years, investment in these programmes has slowed down. Funding and de-risking these technologies is part of the income diversification strategy implemented through its business development and commercialisation function within divisions.

Table A1: Sample CSIR technologies aligned to "grassroots innovation"

No.	Technology	Description and progress
1	**TV White Spaces**	Provides affordable broadband services to rural households and enterprises, empowering rural digital entrepreneurs.
3	**Ngiyaqonda**	A mobile application that creates a multimodal, multilingual learning environment using grammar-based natural language generation and speech technology.
4	**African Ginger**	Investigates medicinal properties of African ginger through clinical trials.
7	**Nozala Bakeries**	Supports rural bakeries by renovating facilities and optimising food manufacturing processes for food safety compliance.
8	**Precision Agriculture Information System**	Uses big data analytics to support precision farm management and agricultural service industry efficiencies.
9	**Ilima**	A farm-to-fork platform for small-scale farmers to improve market access.
10	**Food Dung and Food Waste to Biogas**	Converts food waste into biomethane for energy use and high-quality compost using the Bokashi process.
11	**Modular Clinics**	The concept for rapid deployment and easy expansion of clinics.
12	**Umbiflow**	A low-cost medical ultrasound device to measure umbilical blood flow and reduce stillbirth rates. Licensed to Lodox; finalisation of data pack and Conformité Européenne (or CE) mark in progress.
13	**Cardiflow**	Diagnostic tool using ultrasound technology to assess blood flow in carotid arteries.
14	**Green Bricks**	Interlocking blocks made from recovered construction and demolition waste and glass.

Marketing in support of BD&C

For the CSIR to succeed in improving the competitiveness of high-impact industries, localising transformative technologies and driving socioeconomic transformation, it needs to raise its profile among key target audiences/stakeholders. To this end, the CSIR Communication and Marketing Strategy outlines how the organisation must communicate with its stakeholders in support of the activities undertaken by the BD&C function. The aim is to influence new clients to buy the services and innovations while retaining existing ones and forging new partnerships for medium to long-term relations.

The focus is to employ innovative, creative and effective communication solutions and support business development objectives; buttressed by a sound understanding of the organisation's work and role within the NSI, as well as the organisation's evolving RD&I strategy. The CSIR Strategic Communication and Marketing Strategy was adopted by the CSIR Board during 2020/21. The CSIR Strategic Communication and Marketing Strategy has five objectives.

Raising the visibility of the CSIR, communicating impact and building brand reputation

Contributing to **attracting RD&I business** and **commercialisation opportunities** in public and private sectors

Promoting the CSIR as an employer of choice

Contributing to informed, engaged employees pursuing a common goal

Spearheading science engagement

The biggest effort towards SO5 has been the increased industry engagement and private sector income towards achieving a benchmark distribution of income of 55–60% public sector and 15–20% contribution of private and international income by 2025. Trends from the past two years have highlighted challenges in growing private sector income, especially in the defence and security-related industries. Significant commercialisation income is expected to be realised from 2025/26 from equity deals and technologies licences. One key weakness of current licences issued is that some licensees are either start-ups or SMMEs with limited resources, distribution channels and/or market reach.

Strategic partnerships in Africa

The objectives of the CSIR Africa Strategy include fostering collaborative research, strengthening capacity building, driving technological innovation, influencing evidence-based policy, and promoting sustainable development across the continent. The strategy also aims to enhance access to funding and establish knowledge-sharing platforms. By focusing on these objectives, CSIR aims to enhance its positioning to support addressing key challenges in Africa, promote innovation and foster sustainable development. The strategy emphasises the importance of partnerships with other African research institutions, universities, industry players and international organisations. The strategy also aligns with various continental and regional initiatives, such as the African Union's Agenda 2063 and the Science, Technology and Innovation Strategy for Africa (STISA-2024), to ensure a cohesive approach to development.

A key component of the strategy is the situational analysis, which assesses the current status of CSIR's engagement in Africa, the continent's socioeconomic challenges, and the potential for collaboration. The analysis identifies gaps in scientific and technological capabilities as well as the need for capacity building. It also highlights opportunities for innovation in areas such as renewable energy, water management, agriculture, healthcare and information technology. The strategy aims to leverage these opportunities to foster sustainable development and economic growth across Africa.

The CSIR's track record in Africa is showcased through various initiatives and programmes that have contributed to regional development. These include the Science Diplomacy Capital for Africa initiative, the AUDA-NEPAD Centre of Excellence in Science, Technology, and Innovation, and the SADC Groundwater Management Institute, the Southern African Network for Biosciences (SANBio) in partnership with the DSTI, the African Laser Centre in partnership with the DSTI, Marine and Coastal Operations Southern Africa (MarCOSIO) as well as the Biomanufacturing skills development on the continent in partnership with the Bill and Melinda Gates Foundation. These initiatives demonstrate CSIR's commitment to addressing critical challenges in Africa through strategic partnerships, collaborative research, capacity building, and technological innovation. The strategy aims to build on this track record by expanding CSIR's engagement and impact across the continent.

As Africa's premier Research-Technology-Organisation, in partnership with the DSTI, AUDA-NEPAD and other strategic partners we plan to lead the development an African RTO network to advance visibility and continental RDI capacity in support of STISA and Africa 2063.

The CSIR undertakes to develop a targeted proposal to co-ordinate SADC platforms for engagement on key topics of industrialisation and sustainable development amongst other topic.

The strategy highlights potential funding sources, including government grants, international development agencies, private foundations, and industry partnerships. By implementing this strategy, CSIR aims to enhance its impact and contribute to the scientific, technological, and socioeconomic development of the African continent.

The Parliamentary Grant

The parliamentary grant is a crucial source of funding for the CSIR, enabling it to fulfil its mandate of conducting multidisciplinary research and technological innovation. This grant supports the CSIR's efforts to foster industrial and scientific development in South Africa, contributing to the improvement of the quality of life for its citizens. The funding provided through the parliamentary grant allows the CSIR to undertake strategic research projects, develop transformative technologies and collaborate with various stakeholders, including the private and public sectors.

Additionally, the parliamentary grant ensures the financial sustainability of the CSIR, allowing it to maintain and enhance its research infrastructure, invest in human capital development, and support the commercialisation of innovations (Table A2). This funding is essential for the CSIR to achieve its strategic objectives, including improving the competitiveness of high-impact industries, driving socioeconomic transformation, and supporting the development of a capable state. Overall, the parliamentary grant plays a vital role in enabling the CSIR to drive innovation and contribute to South Africa's industrial and economic growth.

Table A2: PG Investment Framework

PG investment/allocation categories	PG investment subcategories
PG baseline investment in divisions/clusters	Division 1: Advanced Chemistry and Life Sciences
	Division 2: Advanced Production and Security
	Division 3: Smart Society
PG baseline allocation to portfolios/support functions	Business Excellence and Integration (BEI)
	Legal Compliance and Business Enablement
	Finance ICT and Strategic Procurement
	Human Capital and Communication
Capability development initiatives	Research Centres
	New Capability Development Strategic Initiatives
	Research Infrastructure
	Human Capital and Skills Development
Commercialisation and technology transfer	Accelerator Fund
	Apex Fund
	Commercialisation Vehicle
Strategic fund	Legal services provision
	Environmental Health and safety provision
	Health and well-being
	CSIR Conference
	Strategic initiatives of Exco
CSIR Board and CSIR Governance Structures	CSIR Board and other CSIR governance committees

A.3.7 GOOD GOVERNANCE

Inherent in the CSIR mission is the pursuit of inclusive and sustainable advancement in industry and society. Beyond leading innovation and providing unique solutions to address South Africa's challenges, the impact we seek is to improve lives and this translates to the wider obligation of the organisation to operate as a responsible corporate citizen. The CSIR must duly comply with all legal imperatives, whether constitutional, national or common law, with due regard to the governance implications for CSIR business. South Africa is also a signatory to several international treaties and several international strategies inform the work of the organisation.

Corporate social responsibility is entrenched within our EPIC value system. It is our obligation to carefully consider the interests of all our stakeholders and the environment within which we operate to ensure that we appreciate the social and environmental consequences of our business activities. In support of the CSIR's corporate citizenship strategy, critical emphasis will continue to be placed on the following initiatives:

- Enhanced implementation of the compliance function as part of our combined assurance model to more effectively manage risks associated with compliance, business ethics and fraud prevention;
- The enhancement of safety, health and environmental practices through integrated collaboration with all internal and external stakeholders to pursue zero harm;
- The active pursuit of strategies to improve the CSIR's carbon footprint against a trajectory of continuous improvement; and
- Contributions to B-BBEE, based on **the dtic** codes of good practice, with a specific focus on the critical role that the youth of South Africa must play in shaping our economy.

Table A3: Strategic RD&I Initiatives (2025/26–2029/30)

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
1. Future Production: Chemicals cluster					
1.1	Advanced Materials	• Focus on developing nanostructures and advanced materials (polymers, fibres, cosmetics, energy materials) as well as devices for local industries, including support for industry and SMMEs for the full value chain of product development from research to prototyping	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Industrialisation through localisation • Green economy interventions • Energy security	• Modernising Manufacturing • Circular Economy • Health innovation • Energy Innovation • Innovation-enabled Capable State
1.2	Biomanufacturing Technologies	• Support for sustainable chemical production through bioprocessing and biopharmaceuticals, as well as biocatalysis and biorefinery capabilities, targeted towards SMME and industry support in product development • A particular focus on skills development in 2025/26 locally and in Africa	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Industrialisation through localisation • Green economy interventions	• Modernising Manufacturing • Circular Economy • Health Innovation • Innovation-enabled Capable State
1.3	Pharmaceutical Technologies	• Support the development of a local biopharmaceutical industry by providing key infrastructure as well as flow chemistry expertise	• Inclusive growth and job creation, • Reduce poverty and tackle the high cost of living	• Infrastructure investment and delivery • Industrialisation through localisation	• Modernising Manufacturing • Health Innovation

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
2. Advanced Agriculture and Food cluster					
2.1	**Smart Agriculture** • 4IR technologies for supporting small-scale farmers - Supporting industries along the agricultural value chain with actionable farm-level data or intelligence to enable precision agriculture and cost-effective business decisions (yield predictions, climate impact modelling, etc.) at all levels of the value chain	• Increase the efficiency of crop production in the era of climate variability • Increase the contribution of small-to-medium-scale growers • Understanding the movement in the price of crops, with implications for food security, profitability and logistics	• Spatial Integration, Human Settlements and Local Government • Economic Transformation and Job Creation	• Strengthening agriculture and food security	• Modernising Agriculture
2.2	**Agroprocessing** • Indigenous Knowledge Systems - Development of complementary medicines, cosmetics and food products • Extraction of cannabinoids and formulation of cannabis-related product types with SMMEs and big companies • Value addition of food waste streams to address food waste in a circular economy model	• Introduction of IKS-based products into the market and the development of the rural economy • Establish two distinct value- chains for cannabis industrialisation, e.g. hemp and medicinal cannabis industries • Develop and promote uniform (international) standards for production and processing to ensure compliance with health standards, quality products and commercialisation. Support evidence-based decision-making, e.g. Clinical Trials for new, high-quality medicinal cannabis products • Contribute to the development of the South African circular economy. Management of waste for sustainable development.	• Drive growth in labour-intensive sectors such as agriculture. • Grow and transform SA's science capabilities infrastructure. • Ensure that skills development is linked more closely to demand in the economy.	• Industrialisation through localisation • Strengthening agriculture and food security • Gender equality and economic inclusion of women and youth	• Innovation for a healthy society • Modernising Agriculture
2.3	**Food Safety Innovations** • Monitor unregulated and emerging biological and chemical hazards in food, offer high-end analysis for contaminants, and provide food safety compliance services.	• The initiative supports food safety compliance through certification, training and product development. This helps food producers meet regulatory standards and improve the safety of their products.	• Economic Transformation and Job Creation	• Strengthening agriculture and food security	• Innovation for a healthy society • Modernising Agriculture

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
3. NextGen Health cluster					
3.1	**Vaccine Manufacturing and Innovation** • Develop local capabilities to manufacture vaccines and biologics.	• The goal is to establish local capability to manufacture pharmaceuticals originating from local research and development. This will address the current gap in pharmaceutical manufacturing and enhance pandemic preparedness	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Infrastructure investment and delivery • Industrialisation through localisation	• Modernising Manufacturing • Health Innovation • Innovation-enabled Capable State
3.2	**Next-Generation Molecular Diagnostics** • Developing and deploying advanced diagnostic technologies to address both human and veterinary health needs	• Provide rapid, real-time detection at the POC setting, thus producing quick decision-making and better disease management	• Economic Transformation and Job Creation • Education, Skills and Health	• Industrialisation through localisation	• Health Innovation • A re-industrialised modern economy
3.3	**Development of Tools for Drug Development, Personalised medicines and Pharmacovigilance** • Creating tools for precision cancer treatments, pharmacovigilance and drug development	• To enhance health outcomes and maximise the return on investment for health through patient appropriate treatment, and enabling the regulator to better monitor particular products deployed in our markets	• Economic Transformation and Job Creation • Education, Skills and Health	• Industrialisation through localisation	• Health Innovation

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
4. Defence and Security cluster					
4.1	Develop defence technologies that enhance designated sovereign capabilities and ensure strategic independence	• Established RD&I in the fields of aerodynamic test and evaluation, space, stores integration, air operations and airborne autonomous systems • Competitive and innovative national surveillance and situational awareness capability • Applied operational research, development and innovation in support of Special Operations maritime, airborne and landwards capabilities • Homegrown identity management, cyber and information security solutions and approaches to securely identify and protect people (cradle to grave) and systems (physical and digital) against vulnerabilities, threats and risks • Market competitiveness of the industries and operation effectiveness of users through collaborative technological innovations on forensic of energetic materials, protections, firepower, vehicle mobility and dismounted systems.	• A capable, ethical and developmental state • Inclusive growth and job creation	• Infrastructure investment and delivery • Energy security • Industrialisation through localisation • Mass public employment interventions	• Innovation-enabled Capable State

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
4. Defence and Security cluster					
4.2	Establish a world-class National Information and Cyber Security capability	• Established a Virtual Security Operation Centre, providing a consolidated cybersecurity situational awareness capability for government, municipalities, the private sector and the wider African market. • Locally developed and implemented multimodal identity technologies for secure and reliable identity recognition of people and intangibles. • Homegrown law enforcement and security cluster solutions are deployed and used for national security. • Supporting government, municipalities, and private sector in improving their information and cybersecurity governance, privacy and trust.	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Infrastructure investment and delivery • Energy security • Industrialisation through localisation • Mass public employment interventions • Macro-economic policy interventions	• Modernising Manufacturing • Digital Economy • Circular Economy • Energy Innovation • Innovation-enabled Capable State
4.3	Building the capabilities to combat crime	**Reduction of the following crime-related challenges:** • cash-in-transit crimes; • cyber/digital crimes; • illegal border crossings; • illicit mining; • infrastructure-related crimes; and • social unrest; threats to community safety and wildlife crimes • Increased interoperability within the security cluster • Integration of the CMORE situational awareness platform into SOE and other government departments' operational environments. • Develop a security operational concept to address this risk and lead to a reference security architecture that can be used nationally for crime intelligence protection.	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Infrastructure investment and delivery • Industrialisation through localisation • Mass public employment interventions • Strengthening agriculture and food security • Macro-economic policy interventions	• Digital Economy • Circular Economy • Innovation-enabled Capable State

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
5. Future Production: Manufacturing cluster					
5.1	**Industrial Machinery and Equipment** • Support and enhance the localisation of products within South African industry by developing internationally competitive technologies and products for local manufacture through reverse engineering, systems design engineering, multidisciplinary design optimisation, and the implementation of a thorough lifecycle product development framework	• Competitive products and technologies developed with industry, increase in locally designed and manufactured products exported. (e.g. Metalix, Mobile LSP, ViMo2.0, NMISA, Blockchain calibration system) • Contribute towards technology and product localisation in support of **the dtic's** master plans. • Increased joint product development with industry • Fewer but larger technology and product development programmes. Result in more products with export potential • Stimulate re-industrialisation through local innovation and manufacturing with increased licencing income. • Improved industry competitiveness and potential for companies to be included in global supply chains	• Inclusive growth and job creation	• Infrastructure investment and delivery • Energy Security • Industrialisation through localisation	• Modernising Manufacturing • Modernising Mining • Energy Innovation • Innovation-enabled Capable State

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
5. Future Production: Manufacturing cluster					
5.2	**Medical Devices Manufacturing and Health Sector Strategy** • Unlock a role for the CSIR in the MedTech Masterplan, build sector networking, focus on healthcare funding streams, innovate in medical devices, support SMMEs in MedTech, and increase regulatory knowledge	**Patients and Caregivers** • Healthcare that is affordable accessible and effective • Improved health and quality of life Medical **Device Industry** • Growth of the medical device sector • Reduced imports/increased exports – • Localisation/local manufacturing, create jobs • Sector sustainability and strategic independence **Government** • Reduced public healthcare costs • Improved health of its citizens and their ability to contribute economically	• Inclusive growth and job creation	• Industrialisation through localisation • Macro-economic policy interventions	• Modernising Manufacturing • Innovation-enabled Capable State • Health Innovation
5.3	**Rail Industry Development** • Develop and deploy key technologies in rolling stock, infrastructure, operations, maintenance, safety, and security to stabilise and grow rail volumes transported by current and future operators while maintaining stakeholder relationships in the national rail ecosystem	• Development and deployment of new rail technologies • Localisation of rail components, systems and technologies • Savings in replacement and recovery costs for rail operators and the national infrastructure owner • Preservation of jobs in the rail sector and the creation of new jobs by supporting the growth of the industry	• Inclusive growth and job creation • A capable, ethical and developmental state	• Industrialisation through localisation • Macro-economic policy interventions	• Modernising Manufacturing • Economic transformation and job creation • Innovation-enabled Capable State

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
6. Future Production: Mining cluster					
6.1	**Decarbonisation using Green Mobility in Mining Initiative** • Development of a decarbonisation programme for the mining industry, which focuses on technologies that support green mobility	• Contribute to the decarbonisation of the mining industry • Develop high-impact decision-support information, studies, and tools for the mining industry • Supporting local SMMEs to participate in the clean energy transition	• Inclusive growth and job creation	• Green economy interventions • Energy security	• Modernising Mining • Energy Innovation, Circular economy, • Innovation-enabled capable state.
6.2	**Digital Integration Platforms** • Develop significant capability in system integration and digital platforms that support the integration of systems used by various original equipment manufacturers (OEMs) and software providers in the mining industry	• Drive value for the mining industry, reduce systems in use where information and data are duplicated • Contribute towards simplifying systems and digital platforms • Reduce system costs • Develop a system integrating platforms • Supporting the industry with their key challenges	• Inclusive growth and job creation	• Infrastructure investment and delivery • Industrialisation through localisation.	• Modernising mining • Innovation-enabled capable state
6.3	**Safety and Health Initiative** • Develop high-impact decision-support tools to assist in decision-making for mining operators and management	• Improve planning and monitoring of mining operations for process optimisation • Provide operational decision support • Contribute towards the zero harm objective of the Mining Industry • Develop new technologies and processes to support a safe work environment.	• Building a capable, ethical and developmental state • Inclusive growth and job creation	• Infrastructure investment and delivery • Gender equality and inclusion of women and youth	• Digital Economy • Innovation-enabled capable state • Modernising Mining

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
7. NextGen Enterprises and Institutions cluster					
7.1	**Smart Government Services** Leverage digital technologies and data to increase the capability of the state and improve service delivery	• National Electronic Medical Record for primary healthcare; Core Information systems for NHI • Extend the National Oceans and Coasts Information Management System (OCIMS) applications across the continent (through the African Union Commission) • Use of e-Participation technologies to improve the participation of the public in government and policy • Affordable private cloud offering to organs of state and SMMEs • Broader application of digitalisation to organs of state to improve service delivery	• Inclusive growth and job creation • A capable, ethical and developmental state	• Infrastructure investment and delivery • Industrialisation through localisation • Reduced cost and increased quality of digital communications	• Health Innovation • Innovation-enabled Capable State • The future of society • Digital Economy • Future-proof education and skills
7.2	**Financial Inclusion and Intelligence** Bolster the financial sectors' resilience, competitiveness and coverage through technology enablement	• Enablement of the financial industry and law enforcement agencies to fulfil the Financial Action Task Force (FATF) standards. • Technologies that promote financial inclusion • Enablement of the insurance industry to improve pricing for natural disasters	• Inclusive growth and job creation • A capable, ethical and developmental state	• Industrialisation through localisation • Gender equality and economic inclusion of women and youth	• Digital Economy • Innovation-enabled Capable State • A reindustrialised modern economy • The future of society
7.3	**Digital Economy Enablement** Unlock the transformative power of next-generation technology to support the digital economy	• Localised digital technologies/capabilities as foundational pillars of the digital economy • Spectrum sharing technology to reduce the connectivity divide • Reduction in ICT imports and cost of ownership through open RAN solutions • Energy efficient 5G applications • Address language barriers and low literacy levels that hamper universal access to information • Enabling private sector adoption of Generative AI and Natural Language Processing solutions across key domains	• Inclusive growth and job creation • A capable, ethical and developmental state	• Economic inclusion of marginalised • Gender equality and economic inclusion of women and youth • Industrialisation through localisation • Infrastructure investment and delivery • Reduced cost and increased quality of digital communications	• Digital Economy • Circular Economy • Innovation-enabled Capable State • The future of society • Future-proof education and skills • A reindustrialised modern economy • Innovation for energy security

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
8. Smart Places cluster					
8.1	**Human Settlements, Utilities and Services** • Support the building of a capable state in the provisioning of end-to-end service solutions	• Energy and water security • Just transition • Sustainable and smart human settlements • Green infrastructure • Disaster mitigation and management • Climate change adaptation and mitigation • Net-zero drive • Carbon trading	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Infrastructure investment and delivery • Energy security • Gender equality and economic inclusion of women and youth • Green economy interventions	• Digital Economy • Circular Economy • Energy Innovation • Innovation-enabled Capable State
8.2	**Industrial Revitalisation Programme** • Support industrial revitalisation and the transition to a low-carbon, climate-resilient and globally competitive industry	• Revitalisation of industrial parks and economic development zones • Infusing eco-industrial methodologies including sustainable energy, water and waste management • Promoting Just (Energy) Transition. • Carbon accounting and trading for global competitiveness and transition to a net-zero economy. • Industrial competitiveness.	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Industrialisation through localisation • Energy security • Infrastructure investment and delivery • Gender equality and economic inclusion of women and youth • Green economy interventions • Support for the recovery and growth of the tourism industry, cultural and creative industries	• Modernising Manufacturing • Modernising Mining • Digital Economy • Circular Economy • Energy Innovation

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
8. Smart Places cluster					
8.3	**Ocean, Coastal and Marine Science and Ports Operations** • Leading Southern Ocean science, technology, socioeconomic livelihoods and efficient green port operations and industries	• Sustainable Shores- coastal erosion, flood risk, pollution • Ecosystem Restoration and sustainability – blue carbon, fisheries and ecosystem services • Efficient green ports – integrated ports management, eco-greening technologies, bio-enhancement • Coastal industries – energy and fuel	• Inclusive growth and job creation • Reduce poverty and tackle the high cost of living • A capable, ethical and developmental state	• Infrastructure investment and delivery • Gender equality and economic inclusion of women and youth • Support for the recovery and growth of the tourism, cultural and creative industries • Green economy interventions • Strengthening agriculture and food security	• Modernising Manufacturing • Modernising; Agriculture • Modernising Mining • Digital Economy • Circular Economy • Health Innovation • Energy Innovation • Innovation-enabled Capable State
9. Smart Mobility cluster					
9.1	**Intelligent Transport Systems and Operations** • Development of methods, systems, models and technologies to advance the sustainable transport agenda, utilising the core disciplines of transport and traffic engineering, transport economics, structural engineering, ICT, data science, computer engineering and software development	• A safe, accessible and efficient transport network	• A capable, ethical and developmental state • Inclusive growth and job creation	• Industrialisation through localisation	• Digital Economy and ICT

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
9. Smart Mobility cluster					
9.2	**Transport Infrastructure Engineering** • Development of engineering and technological solutions for efficient and effective design, construction, maintenance and management of mobility infrastructure for operational sustainability, climate adaptation and resilience while endorsing circular economy principles throughout the sector	• Improved safety and efficiency of ports and protected coastal zones; smart and resilient road and rail infrastructure	• A capable, ethical and developmental state • Inclusive growth and job creation	• Green economy interventions • Industrialisation through localisation • Infrastructure investment and delivery	• New technologies in the transport sector
9.3	**National Logistics System** • Enhanced functioning of the national logistics system, which is critical for industrialisation and competitive local and international trade	• Measurable and predictable logistics performance across industry sectors critical for economic growth at macro and micro levels	• Inclusive growth and job creation	• Macro-economic policy interventions • Strengthening logistics ecosystems and supply chains across key industries including agriculture and food security	• Digital Economy and ICT

a MTDP Strategic Priorities – Inclusive growth and job creation, Reduce poverty and tackle the high cost of living, A capable, ethical and developmental state.

b ERRP Priority Interventions – Infrastructure investment and delivery; energy security; gender equality and economic inclusion of women and youth; industrialisation through localisation; support for the recovery and growth of the tourism, cultural and creative industries; green economy interventions; mass public employment interventions; strengthening agriculture and food security; macro-economic policy interventions.

c Decadal Plan's Key Economic Sectors Addressed - Modernising Manufacturing, Modernising Agriculture, Modernising Mining, Digital Economy, Circular Economy, Health Innovation, Energy Innovation, Innovation-enabled Capable State

Table A4: CSIR C³ Strategic Initiatives (2025/26–2029/30)

No.	Strategic Initiative Description	Envisaged Impacts	[a]MTDP Priorities	[b]ERRP Priority Interventions	[c]Decadal Plan – Key Economic Sectors
CSIR C³					
1	Accelerate Technology Commercialisation	• Commercialisation of high-potential technologies emerging from CSIR's R&D efforts, focusing on sectors such as manufacturing, health, energy, defence, and environmental sustainability	• Inclusive growth and job creation	• Industrialisation through localisation	• Modernising Manufacturing • Modernising Agriculture • Modernising Mining • Digital Economy • Circular Economy • Health innovation • Energy Innovation • Innovation-enabled Capable State
2	Increase Funding and Investment	• Financing 3-5 investments per year with total first-round investments ranging between R10 million to R15 million			
3	Expand Strategic Partnerships	• Expanded partnerships with industry players, investors, and government agencies to facilitate the commercialisation of CSIR technologies			
4	Strengthen the Technology Pipeline	• Steady pipeline of high-impact technologies by reviewing, triaging, and prioritising CSIR technologies for commercialisation			
5	Support and Nurture Investments	• Nurture early-stage ventures by providing technical support, mentoring, and business development services			
6	Build a High-Impact Investment Portfolio	• Diversified investment portfolio that maximises returns and minimises risks, focusing on high-impact, scalable technologies			
7	Enhance Operational Efficiency	• Streamlined operations, enabling CSIR C³ to manage the complete investment process efficiently—from sourcing technologies and conducting due diligence to term sheet development, legal documentation, and securing internal approvals.			

a MTDP Strategic Priorities – Inclusive growth and job creation, Reduce poverty and tackle the high cost of living, A capable, ethical and developmental state.

b ERRP Priority Interventions – Infrastructure investment and delivery; energy security; gender equality and economic inclusion of women and youth; industrialisation through localisation; support for the recovery and growth of the tourism, cultural and creative industries; green economy interventions; mass public employment interventions; strengthening agriculture and food security; macro-economic policy interventions.

c Decadal Plan's Key Economic Sectors Addressed - Modernising Manufacturing, Modernising Agriculture, Modernising Mining, Digital Economy, Circular Economy, Health Innovation, Energy Innovation, Innovation-enabled Capable State

A4 KPI TARGETS

Table A5: Five-year KPI targets

Indicator		Target 2024/25	Target 2025/26	Target 2026/27	Target 2027/28	Target 2028/29	Target 2029/30
SO1:	**Conduct RD&I of transformative technologies and accelerate their diffusion**						
KPI 1:	Publication equivalents	298	**300**	331.5	343	355	365
KPI 2:	New priority patent applications filed	6	**6**	11	13	16	16
KPI 3:	New patents granted	12	**9**	11	13	15	17
KPI 4:	New technology demonstrators	49	**58**	65	74	78	78
KPI 5:	Number of technology licence agreements signed	12	**14**	18	23	27	29
SO2:	**Improve the competitiveness of high-impact industries to support South Africa's re-industrialisation by collaboratively developing, localising and implementing technology**						
KPI 6:	Number of localised technologies	13	**10**	29	33	38	47
KPI 7:	Number of joint technology development agreements being implemented for industry	27	**33**	43	53	65	74
KPI 8:	Number of SMMEs supported	97	**115**	129	144	156	169
SO3:	**Drive socioeconomic transformation through RD&I that supports the development of a capable state**						
KPI 9:	Number of reports contributing to national policy development	14	**17**	27	31	36	36
KPI 10:	Number of standards delivered or contributed in support of the state	9	**9**	14	14	18	18
KPI 11:	Number of projects implemented to increase the capability of the state	79	**117**	134	147	158	165
SO4:	**Build and transform HC and infrastructure**						
KPI 12:	Total SET staff	1 642	**1 642**	1 642	1 659	1 697	1 734
KPI 13:	Percentage of SET staff who are black	69%	**72%**	72%	72%	72%	72%
KPI 14:	Percentage of SET staff who are female	38%	**40%**	40%	40%	40%	41%
KPI 15:	Percentage of SET staff with PhDs	19%	**19%**	19%	19%	19%	19%

Indicator	Target 2024/25	Target 2025/26	Target 2026/27	Target 2027/28	Target 2028/29	Target 2029/30
KPI 16: Total chief researchers	18	**20**	21	26	29	31
KPI 17: Percentage of chief researchers who are black	28%	**30%**	35%	38%	38%	42%
KPI 18: Percentage of chief researchers who are female	28%	**20%**	24%	35%	38%	42%
KPI 19: Total principal researchers	195	**195**	195	203	209	218
KPI 20: Percentage of principal researchers who are black	37%	**40%**	40%	40%	41%	42%
KPI 21: Percentage of principal researchers who are female	24%	**23%**	26%	27%	30%	31%
KPI 22: Number of staff involved in exchange programmes with industry	32	**31**	34	38	42	45
KPI 23: PPE investment (Rm)	160	**165**	170	174	178	181
SO5: Diversify income, maintain financial sustainability and good governance						
KPI 24: Total income (Rm)	3 121	**3 207**	3299	3 356	3 413	3 471
KPI 25: Net profit (Rm)	(67.6)	**(30.8)**	5	16	23	41
KPI 26: South African public sector income (% total income)	58%	**59%**	58%	58%	57%	57%
KPI 27: South African private sector income (% total income)	8%	**8%**	8%	9%	9%	9%
KPI 28: International contract income (% total income)	11%	**11%**	11%	12%	12%	13%
KPI 29: B-BBEE rating	1	**1**	1	1	1	1
KPI 30: RIR	≤0.4	**≤0.3**	≤0.2	≤0.1	0	0
KPI 31: Audit opinion	Unqualified audit opinion	**Unqualified audit opinion**	Unqualified audit opinion	Unqualified audit opinion	Unqualified audit opinion	Unqualified audit opinion

A5 KPI DEFINITIONS

KPIs provide an understanding of performance in terms of inputs, outputs and efficiencies and, to some extent, provide lead indicators of the outcomes and impact that are required for the CSIR to fulfil its mandate. The question of whether the CSIR is meeting its strategic objectives related to achieving outcomes and impact cannot be resolved by KPI assessment alone and requires a process of programme evaluation as described in the National Evaluation Policy Framework. The strategic objectives provided in the CSIR Strategic Plan make specific statements on planned outcomes that will serve as the basis for future evaluation of performance in this regard. The CSIR KPIs provide a basket of measures that reflect various aspects of the organisation's performance. The targets that are set reflect, in the context of limited resources, a strategic choice about the areas in which the greatest impact can be achieved.

KPI 1: PUBLICATION EQUIVALENTS

Indicator title	Publication equivalents
Definition	Publication equivalents consist of peer-reviewed journal articles, peer-reviewed conference papers, peer-reviewed book chapters and books.
Purpose	Research publications are a measure of the CSIR's research capabilities and outputs. The quantity and quality of peer-reviewed research publications is a measure of the quality and depth of the scientific knowledge base.
Performance assessment	The CSIR considers a performance equal to and above 95% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	Publications are entered in the CSIR Technical Outputs Database (TOdB), which provides the information for reporting.
Data responsibility	BEI: CSIR Information Services.
Method of calculation	The number of publication equivalents assigned to each type of publication as per the approved Publication Equivalent Guidelines. The publications are counted over the calendar year preceding the year in which the financial year ends.
Limitations	Authors submit publications for inclusion in TOdB via WorkFlow. There may be some under-reporting if individual authors do not submit their manuscripts for inclusion. However, there are also measures in place to automatically include publications whose authors are affiliated to the CSIR.
Type of indicator	Output.
Exclusions	Publications not submitted to the TOdB will not be allocated publication equivalents. Publications not subjected to scholarly peer review.

KPI 2: NEW PRIORITY PATENT APPLICATIONS FILED

Indicator title	New priority patent applications filed
Definition	A priority patent is the first patent application filed for the protection of a particular invention with the CSIR named as an applicant/assignee/co-applicant/ co-assignee.
Purpose	The basic purpose [of the right of priority] is to safeguard, for a limited period, the interests of a patent applicant(s) in their endeavour to obtain international protection for their invention. At the CSIR, priority patent filings serve as a pipeline indicator of patent families.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	Knowledge Sharing Systems (KSS) records containing evidentiary supporting documentation (from patent attorneys, patent offices and/or reliable patent databases) offices.
Data responsibility	BEI: Intellectual Property and Technology Transfer.
Method of calculation	Number of qualifying records on KSS.
Limitations	Steps must be taken to avoid double counting of applications that have been previously filed but withdrawn and refiled at a later date (despite obtaining a new priority number and priority date).
Type of indicator	Output.
Exclusions	• Any patent application that is not the first application filed in respect of a particular invention, including (without limitation) re-filings/conversions/ nationalisations/ continuations/divisional and so forth of a previously filed application. • Patent applications for which evidentiary supporting documentation is lacking. • Patent applications that do not name the CSIR as an applicant/assignee/ co-applicant/co-assignee.

KPI 3: NEW PATENTS GRANTED

Indicator title	New patents granted
Definition	Patents are exclusive rights granted for inventions granted by an examining patent authority with the CSIR named as an applicant/assignee/co-applicant/co-assignee.
Purpose	Patents provide a lead indicator of the potential impact to be achieved when technologies are commercialised.
Performance assessment	The CSIR considers a performance equal to and above 80% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	KSS records containing evidentiary supporting documentation (from patent attorneys, patent offices and/or reliable patent databases).
Data responsibility	BEI: Intellectual Property and Technology Transfer
Method of calculation	• Number of qualifying records on KSS. • For patents from the same patent family granted in multiple territories, each patent granted by an examining authority is counted individually. • Where a patent is granted by a regional patent authority (e.g., EPO), only the EPO grant is counted, not the national validations in designated countries. • In cases where notification of a patent is only received after the results for the financial year have been completed, that patent will be included in the subsequent financial year's results. • Only co-owned patents or patents in the name of the CSIR are counted.
Limitations	South Africa and certain other countries do not have examining patent offices. Therefore, patents filed in these countries are not counted for this KPI. The time taken for a patent to be granted after filing is unpredictable and can range from one to eight or even more years, depending on the efficiency of the patent authority concerned and the complexity of the examination process.
Type of indicator	Output.
Exclusions	Patents granted by non-examining patent authorities. Patents for which evidentiary supporting documentation is lacking. Patents that do not name the CSIR as an applicant/assignee/co-applicant/co-assignee. Patents that are national validations of a patent granted by a regional patent authority.

KPI 4: NEW TECHNOLOGY DEMONSTRATORS

Indicator title	New technology demonstrators
Definition	A prototype, a rough example of a conceivable technology (product or system) derived from existing knowledge gained from research and/or practical experience as proof of concept.
Purpose	Measure an intermediate output of RD&I activities with the potential to be developed further and that can be transferred for socioeconomic impacts.
Performance assessment	The CSIR considers a performance equal to and above 85% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	All data are collated in a centralised repository of the Technology Demonstrator Evaluation Panel.
Data responsibility	BEI: RD&I Office.
Method of calculation	Technology demonstrators are submitted by clusters for adjudication to the Technology Demonstrator Evaluation Panel. Count of technology demonstrators as approved by the Technology Demonstrator Panel and adjudicated according to the CSIR Technology Demonstrator Evaluation Framework.
Limitations	None.
Type of indicator	Output.
Exclusions	Only outputs that result from experimental development are considered technology demonstrators, e.g. development of frameworks is not considered.

KPI 5: NUMBER OF TECHNOLOGY LICENCE AGREEMENTS SIGNED

Indicator title	Number of licensed technologies
Definition	A licence agreement is an agreement in terms of which the CSIR grants rights to another party to exploit IP developed by the CSIR, typically in exchange for royalty payments and/or other licence fees. Technologies licensed in this manner must have been disclosed via the invention disclosure process.
Purpose	This indicator is a measure of the uptake of CSIR IP in the market. Technology licences facilitate commercialisation by other parties of the CSIR's scientific and technological outputs.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	Copies of signed licence agreements and records in KSS.
Data responsibility	BEI: Intellectual Property and Technology Transfer
Method of calculation	• Number of licence agreements signed. • Technology licences are proposed and negotiated with other parties by CSIR divisions and are approved and granted in accordance with relevant legislation and the CSIR Commercialisation and Approval Frameworks. • Assignments of IP shall also be included if all other criteria are met and if the assignment is not a conversion of licenced rights to the same IP that has already/previously been licensed to the assignee.
Limitations	None.
Type of indicator	Output.
Exclusions	Only full licence agreements negotiated and concluded with another party are counted. This KPI excludes: • Instant access licences; and • Evaluation agreements (or similar).

KPI 6: NUMBER OF LOCALISED TECHNOLOGIES

Indicator title	Number of localised technologies
Definition	A localised technology is a technology that has been invented or commercialised outside of South Africa and that has been or will be introduced/adapted in South Africa for the commercial or scientific benefit or a technology that has been locally developed as an import replacement.
Purpose	The indicator aims to diffuse technologies commercialised or industrialised from elsewhere in the world that have demonstrated potential to positively affect the competitiveness of industry upon competent adoption by users or is a strong candidate to be an input into innovation or improvements of other systems for improvement of industrial activities or capabilities of the state.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	• Proof that the technology originated from outside the borders of South Africa, such as licence agreements and intellectual property rights ownership, including in the case of expired or lapsed IP rights; and • An implementation report or technology package developed, or other relevant proof that the technology has been piloted or applied/implemented in local South African conditions.
Data responsibility	CSIR clusters. Central repository held by BEI: Institutional Planning.
Method of calculation	Number of technologies localised.
Limitations	• The agreement date may be before the current financial year. • The KPI can only be claimed once all eligible evidence is satisfied, which may span several years.
Type of indicator	Output.
Exclusions	Excludes a general list of technologies developed by CSIR R&D.

KPI 7: NUMBER OF JOINT TECHNOLOGY DEVELOPMENT AGREEMENTS BEING IMPLEMENTED WITH INDUSTRY

Indicator title	Number of joint technology development agreements being implemented with industry
Definition	A joint technology development initiative with an industry partner under a written agreement, where each party brings the needed capability for the development and implementation of the technology. A third party may fund the initiative. Industry refers to the private sector and public sector corporations (state-owned enterprises).
Purpose	This indicator measures the CSIR's technology development collaborations with industry partners with the intention to commercialise and industrialise.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	• A signed joint technology development agreement. • Proof of joint activities, such as joint R&D outputs (R&D reports, papers, patents, computer-aided design models, technology test reports and so forth); and • Proof of activities performed in the current financial year.
Data responsibility	Divisional and cluster BD&C. Central Repository maintained by BEI: Institutional Planning.
Method of calculation	• Industry includes private sector and public sector corporations (SOEs) that have a direct impact on/contribution to the economy in terms of commercial operations, delivery of products, delivery of services, etc. These include, but are not limited to, the likes of Eskom, Transnet and Denel. • Number of signed agreements for joint technology development and implementation. • Number of active technology agreements in the current financial year.
Limitations	• This definition of the KPI does not differentiate between large joint projects involving many SET-base members and small teams. • This definition does not prescribe a minimum ratio of hours contributed by each party (this ratio will change as projects progress through TRLs).
Type of indicator	Output.
Exclusions	• Pure contract R&D where there is no joint team with an industry partner. • Projects where there is no specific product or process development with industry. • Projects done with government departments.

KPI 8: NUMBER OF SMMEs SUPPORTED

Indicator title	Number of SMMEs supported
Definition	Support of SMMEs as described in the 2019 Revised Schedule 1 of the National Definition of Small Enterprise in South Africa (Government Gazette No. 42304 of 15 March 2019) under the National Small Enterprise Act, 1996 (Act 102 of 1996), read with the National Enterprise Amendment Act, 2003 (Act 26 of 2003) and the National Small Enterprises Act, 2004 (Act 29 of 2004) through the implementation of RD&I and technology interventions that contribute to SMMEs becoming more productive, efficient, and sustainable.
Purpose	The indicator measures the CSIR's contribution to socioeconomic development and industrialisation through the support of SMMEs.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	• Signed agreement with the SMME; and • Proof of SMME status as per National Small Enterprise Act (from, e.g., Central Supplier Database (CSD) reports or a signed affidavit); and • An acknowledgement of delivery of support by the SMME or Proof of work done (e.g. a progress report, invoice and proof of payment, Minutes of meeting, etc.).
Data responsibility	CSIR clusters. Central repository maintained by BEI: Institutional Planning.
Method of calculation	The number of signed agreements with SMMEs. Assumption: even under third-party funding an agreement with a specific SMME should be in place.
Limitations	This is a proxy for impact measurement. Actual impact will only be available from SMME revenue, job growth, growth in a number of SMME business contracts.
Type of indicator	Output.
Exclusions	Subcontracting of SMMEs, unless there is an agreement in place to do capacity development of the SMME to enable delivery.

KPI 9: NUMBER OF REPORTS CONTRIBUTING TO NATIONAL POLICY DEVELOPMENT

Indicator title	Number of reports contributing to national policy development
Definition	Evidence-based policy development support provided to various arms of government.
Purpose	The indicator measures the CSIR's support to government with evidence-based policy development and decision-making that can benefit from a significant SET input.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	• The policy report delivered; and • Acknowledgment of delivery of the policy report by the government department.
Data responsibility	CSIR clusters. Central repository maintained by BEI: Institutional Planning.
Method of calculation	Count of final reports related to new or updated policies received and accepted by the implementing government department. Work completed in the previous financial years but only signed-off in the current financial year will be counted.
Limitations	The KPI as defined here does not account for: • All national policies that do not have the same level of complexity from a SET point of view; and • The effort put in by the CSIR (SET hours), some policy development projects require less input than others.
Type of indicator	Output.
Exclusions	• Development of internal policies for government departments, for example general human resources policies, quality management policies and general management policies. • Contribution to creation or updating of CSIR policies.

KPI 10: NUMBER OF STANDARDS DELIVERED OR CONTRIBUTED TO IN SUPPORT OF THE STATE

Indicator title	Number of standards delivered or contributed to in support of the state
Definition	New or updated standards adopted by the state and SOEs that the CSIR has developed and delivered or to which it contributed. A standard is a published document that contains a technical specification, or other precise criteria designed to be used consistently as a rule, guideline, or definition. It provides target rules, guidelines or characteristics for products, services, or processes and production methods, including requirements as they apply to a product, service, process, or production method.
Purpose	The indicator measures the CSIR's support for government policy and regulation through the development of standardised practice guidelines across economic and social sectors
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	• The standard delivered or contributed to; and • Acknowledgment of delivery of the standard by the government.
Data responsibility	CSIR clusters and portfolios. Central repository maintained by BEI Planning and Knowledge Management.
Method of calculation	Count of new or updated standards adopted by government. In the case of updated standards, significant changes from previous versions must be demonstrated. Examples of standards include interoperability standards, accessibility standards, products, or infrastructure standards. Work completed in the previous financial years but only signed-off in the current financial year will be counted.
Limitations	None.
Type of indicator	Output.
Exclusions	None.

KPI 11: NUMBER OF PROJECTS BEING IMPLEMENTED TO INCREASE CAPABILITY OF THE STATE

Indicator title	Number of projects implemented to increase the capability of the state
Definition	The CSIR-facilitated implementation of technologies (CSIR-created or otherwise) that improve the efficiency of government, SOEs and South African universities.
Purpose	This indicator measures the number of projects that the CSIR implements on behalf of the state.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable. Performance in excess of the target is a positive result.
Data source/eligible evidence	• An active agreement with a government department/SOE/South African university; or • An active agreement with a third party for work intended to increase the capability of the state; and • A progress report of the project being implemented on behalf of government institutions.
Data responsibility	CSIR clusters. Central repository maintained by BEI: Institutional Planning
Method of calculation	Number of projects the CSIR implements on behalf of the state.
Limitations	None.
Type of indicator	Output.
Exclusions	None.

KPI 12: TOTAL SET STAFF

Indicator title	Total SET staff
Definition	Number of CSIR staff qualified in the fields of SET.
Purpose	The indicator is a measure of the CSIR's capacity to deliver on RD&I projects.
Performance assessment	• Performance in terms of the number of SET staff is influenced by financial considerations and should be assessed in the context of financial performance. • The CSIR considers a performance equal to and above 95% of the target as acceptable.
Data source/eligible evidence	Number of SET staff extracted from PeopleSoft HR system.
Data responsibility	CSIR HC.
Method of calculation	Head count of SET staff at the end of the financial year.
Limitations	HC ensures the correct classification of staff in PeopleSoft.
Type of indicator	Output.
Exclusions	Bursars, visiting students/scientists and vacation work appointments.

KPIs 13 AND 14: PERCENTAGE OF SET STAFF WHO ARE BLACK AND FEMALE, RESPECTIVELY

Indicator title	Percentage of SET staff who are black and female
Definition	Percentage of SET staff who are black (as per B-BBEE Act definition) and percentage of SET staff who are female, respectively. South African citizens who are actively involved in RD&I activities. As per the B-BBEE Act definition, black South Africans are Africans, coloureds and Indians, who meet the following criteria: • Citizens of the Republic of South Africa by birth or descent; • Became citizens of the Republic of South Africa by naturalisation before 27 April 1994; or • After 27 April 1994 and who would have been entitled to acquire citizenship by naturalisation prior to that date.
Purpose	These indicators measure the degree of demographic transformation within the RD&I capacity of the organisation.
Performance assessment	• Performance is influenced by the growth in SET staff numbers and may be negatively affected if the target number of SET staff is not achieved. • The CSIR considers a performance within two percentage points from the target as acceptable.
Data source/eligible evidence	Number of employees who are classified as black, as a percentage of the total SET staff extracted from PeopleSoft system.
Data responsibility	CSIR HC.
Method of calculation	The percentages of black South African and female South African staff of total SET staff at the end of the financial year.
Limitations	None – HC ensures the correct classification of staff on the Human Capital database.
Type of indicator	Output.
Exclusions	None.

KPI 15: PERCENTAGE OF SET STAFF WITH DOCTORAL QUALIFICATIONS

Indicator title	Percentage of SET staff with doctoral qualifications
Definition	Proportion of SET staff who have a doctoral level qualification.
Purpose	The indicator measures the organisation's capacity to conduct and supervise quality research and to innovate.
Performance assessment	• Performance is influenced by the growth in SET staff numbers and may be negatively affected if the target number of SET staff is not achieved. • A performance within one percentage point from the target will be considered as acceptable.
Data source/eligible evidence	Number of SET staff with PhD qualifications as a percentage of the total number of SET staff extracted from the PeopleSoft system.
Data responsibility	CSIR HC.
Method of calculation	The percentage of SET staff with doctoral-level qualifications at the end of the financial year.
Limitations	None – HC ensures the validity of data, and that evidence of the qualification is on file.
Type of indicator	Output.
Exclusions	None.

KPI 16: NUMBER OF CHIEF RESEARCHERS

Indicator title	Number of chief researchers
Definition	The number of CSIR staff recognised as chief researchers through the formal Career Ladder process.
Purpose	The indicator is a measure of the quality of SET capacity and its potential influence in the local and international RD&I spaces (capacity to collaborate and share resources).
Performance assessment	• Promotion or appointment at these senior research levels is based on growth in skill and proficiency as measured through the CSIR Career Ladder process. • A performance equal to and above 90% of the target is considered acceptable.
Data source/eligible evidence	Total number of staff appointed as chief researchers as extracted from the PeopleSoft system.
Data responsibility	CSIR HC.
Method of calculation	Count of the number of SET staff who are classified as chief researchers at the end of the financial year.
Limitations	None – HC ensures the validity of data and that the required evidence is on file.
Type of indicator	Output.
Exclusions	Staff not recognised through the career ladder process.

KPIs 17 AND 18: PERCENTAGE OF CHIEF RESEARCHERS WHO ARE BLACK AND FEMALE, RESPECTIVELY

Indicator title	Percentage of chief researchers who are black and female
Definition	The proportion of black (as per B-BBEE Act definition) South African and the proportion of female South African citizens who are Chief Researchers (as per CSIR's Career Ladder process). As per the B-BBEE Act definition, black South Africans are Africans, coloureds and Indians who meet the following criteria: • Citizens of the Republic of South Africa by birth or descent; • Became citizens of the Republic of South Africa by naturalisation before 27 April 1994; or • After 27 April 1994 and who would have been entitled to acquire citizenship by naturalisation prior to that date.
Purpose	These indicators measure the level of demographic transformation at the chief researcher level.
Performance assessment	• Promotion or appointment at these senior research levels is based on growth in skill and proficiency as measured through the CSIR Career Ladder process. • A performance of within five percentage points from the target is considered acceptable
Data source/eligible evidence	Percentages of chief researchers who are black and female, respectively, are extracted from the PeopleSoft system.
Data responsibility	CSIR HC.
Method of calculation	The percentage of black South African and female South African chief researchers at the end of the financial year..
Limitations	None – HC ensures the validity of data and that the required evidence is on file.
Type of indicator	Output.
Exclusions	None.

KPI 19: NUMBER OF PRINCIPAL RESEARCHERS

Indicator title	Number of principal researchers
Definition	Number of CSIR staff recognised as principal researchers through the formal Career Ladder process.
Purpose	The indicator is a measure of the quality of SET capacity and its potential influence in the local and international RD&I spaces (capacity to collaborate and share resources).
Performance assessment	• Promotion or appointment at these senior research levels is based on growth in skill and proficiency as measured through the CSIR Career Ladder process. • A performance equal to and above 95% of the target is considered acceptable.
Data source/eligible evidence	Employees who have been appointed as principal researchers, as indicated on extracted from the PeopleSoft system.
Data responsibility	CSIR HC.
Method of calculation	Count of the number of SET staff who are classified as principal researchers at the end of the financial year.
Limitations	None. HC ensures the validity of data and that the required evidence is on file.
Type of indicator	Output.
Exclusions	Staff not recognised through the career ladder process.

KPIs 20 AND 21: PERCENTAGE OF PRINCIPAL RESEARCHERS WHO ARE BLACK AND FEMALE, RESPECTIVELY

Indicator title	Percentage of principal researchers who are black and female
Definition	Percentage of principal researchers who are black South Africans and percentage of Principal Researchers who are female South Africans. As per the B-BBEE Act definition, black South Africans are Africans, coloureds and Indians who meet the following criteria: • Are citizens of the Republic of South Africa by birth or descent; • Became citizens of the Republic of South Africa by naturalisation before 27 April 1994; or • After 27 April 1994 and who would have been entitled to acquire citizenship by naturalisation prior to that date.
Purpose	These indicators measure the level of demographic transformation within the Principal Researcher level.
Performance assessment	• Promotion or appointment at these senior research levels is based on growth in skill and proficiency as measured through the CSIR Career Ladder process. • A performance of within three percentage points from the target is considered acceptable.
Data source/eligible evidence	KPI information is extracted from the HC database.
Data responsibility	CSIR HC.
Method of calculation	The percentage of black South African and female South African principal researchers at the end of the financial year.
Limitations	None – HC ensures the validity of data and that the required evidence is on file.
Type of indicator	Output.
Exclusions	None.

KPI 22: NUMBER OF STAFF INVOLVED IN EXCHANGE PROGRAMMES WITH INDUSTRY

Indicator title	Number of staff involved in exchange programmes with industry
Definition	The exchange of staff between the CSIR and industry for a period of time to share/gain expertise for the advancement of business growth opportunities and capacity development.
Purpose	The indicator measures the level at which CSIR shares expertise and resources to strengthen collaborations with the industry to achieve organisational growth.
Performance assessment	The CSIR considers a performance equal to and above 75% of the target as acceptable.
Data source/eligible evidence	A signed transfer/secondment agreement.
Data responsibility	CSIR HC.
Method of calculation	• Industry includes private sector and public sector corporations (SOEs) that have a direct impact on/contribution to the economy in terms of commercial operations, delivery of products, delivery of services and so forth. These include, but are not limited to, the likes of Eskom, Transnet and Denel. • Number of staff involved in exchange programmes for a minimum period of one month.
Limitations	None – HC ensures relevant data are captured.
Type of indicator	Output.
Exclusions	Exchange programmes with government departments.

KPI 23: INVESTMENT (Rm) IN PPE

Indicator title	Investment in PPE
Definition	PPE investment is the amount invested in CSIR and government grant-funded PPE, as well as qualifying leases (as per Accounting Standard on Leases) for a financial year.
Purpose	This indicator provides a measure of the CSIR's investment in research infrastructure to develop and maintain world-class facilities and equipment to provide the quality of RD&I that is expected of it.
Performance assessment	The CSIR considers a performance equal to and above 95% of the target as acceptable. The budget target may be exceeded substantially, arising from additional grant funding. This is a successful result and is not the consequence of an inappropriate target.
Data source/eligible evidence	The information for the financial KPIs is obtained from the CSIR financial systems.
Data responsibility	CSIR Finance.
Method of calculation	The value of investment in PPE is the amount of CSIR and grant additions for the year. This information is obtained from reports in the fixed assets system, as well as the CSIR trial balance. Reconciliation is done to analyse the movement in the PPE balance and to break this down among additions, disposals and depreciation. This breakdown is also disclosed in the year-end annual financial statements.
Limitations	None.
Type of indicator	Input.
Exclusions	Equipment that goes back to the third party at the end of the project and is not logged in the CSIR asset list.

KPI 24: TOTAL OPERATING INCOME (Rm)

Indicator title	Total operating income
Definition	Total operating income includes revenue declared on R&D contracts (contract R&D income), income derived from licences and royalties, PG received through the Science Vote and other income.
Purpose	The indicator reflects the ability of the CSIR to ensure financial sustainability. Growth in total operating income indicates growth in the outcomes and impact achieved by the CSIR.
Performance assessment	Performance on financial KPIs needs to be assessed in the context of the prevailing economic climate. The CSIR considers a performance equal to and above 95% of the target as acceptable.
Data source/eligible evidence	Total operating income measured in South African rand extracted from the Income Statement from the CSIR financial systems.
Data responsibility	CSIR Finance.
Method of calculation	• The CSIR annual trial balance from the financial system is updated for audit adjustments and the final figures are incorporated in the CSIR annual financial statements. • The annual financial statements are audited and the KPI results are derived from these audited annual financial statements.
Limitations	None.
Type of indicator	Output.
Exclusions	Net finance income is not included in the definition of total operating income.

KPI 25: NET PROFIT (% TOTAL INCOME)

Indicator title	Net profit (% total income)
Definition	Profit for a financial year is calculated as total operating income; less total operating expenditure (including the performance bonus accrual); plus net finance income.
Purpose	Net profit is a key indicator of financial sustainability and the ability of the organisation to manage its expenses according to affordability determined by income levels.
Performance assessment	• Performance on financial KPIs needs to be assessed in the context of the prevailing economic climate. • The CSIR considers a performance equal to and above 95% of the target as acceptable. • Reducing the budget target is a successful result and is not the consequence of an inappropriate target.
Data source/eligible evidence	The information for the financial KPIs is obtained from the CSIR financial systems.
Data responsibility	CSIR Finance.
Method of calculation	• The CSIR annual trial balance from the financial system is updated for audit adjustments and the final figures are incorporated in the CSIR annual financial statements. • The annual financial statements are audited and the KPI results are derived from these audited annual financial statements.
Limitations	None.
Type of indicator	Output.
Exclusions	None.

KPI 26: SOUTH AFRICAN PUBLIC SECTOR INCOME (% TOTAL INCOME)

Indicator title	South African public sector income (% total income)
Definition	South African public sector income is the total income earned from South African government departments (i.e., national, provincial and local), constitutional entities, and public entities (as listed in the schedules to the PFMA). This includes revenue declared on R&D contracts (contract R&D income), directed/ring-fenced PG received through the Science Vote and any other forms of funding received from South African public entities.
Purpose	South African public sector income reflects the degree of public sector investment in the CSIR.
Performance assessment	• The CSIR's annual target is the percentage of South African public sector income included in the annual total operating income budget, which the CSIR aims to achieve or reduce. • Future targets are set to ensure increased income diversification and impact in other sectors. • The CSIR considers a performance equal to and above 95% of the target as acceptable.

Data source/eligible evidence	The total income received from South Africa public organisations, as a percentage of total income, obtained from the PeopleSoft financial system.
Data responsibility	CSIR Finance.
Method of calculation	• The CSIR annual trial balance from the financial system is updated for audit adjustments and the final figures are incorporated in the CSIR annual financial statements. • The annual financial statements are audited and the KPI results are derived from these audited annual financial statements.
Limitations	None.
Type of indicator	Output.
Exclusions	None.

KPI 27: SOUTH AFRICAN PRIVATE SECTOR INCOME (% TOTAL INCOME)

Indicator title	South African private sector income (% total income)
Definition	South African private sector income is the total income earned from South African non-public entities (not listed as public entities in the schedules to the PFMA and the MFMA). This includes not-for-profit organisations. Licences, royalties and interest income are not included in the definition of
Purpose	South African private sector investment.
Performance assessment	• Performance on financial KPIs needs to be assessed in the context of the prevailing economic climate. • The CSIR considers a performance equal to and above 95% of the target as acceptable.
Data source/eligible evidence	The total income received from South African private organisations, as a percentage of total income, obtained from the PeopleSoft financial system.
Data responsibility	CSIR Finance.
Method of calculation	• The CSIR annual trial balance from the financial system is updated for audit adjustments and the final figures are incorporated in the CSIR annual financial statements. • The annual financial statements are audited and the KPI results are derived from these audited annual financial statements.
Limitations	None.
Type of indicator	Output.
Exclusions	Licences, royalties and interest income are not included in the definition. Income from government departments.

KPI 28: INTERNATIONAL CONTRACT INCOME (% TOTAL INCOME)

Indicator title	International contract income (% total income)
Definition	International contract income is the total income earned from foreign customers (i.e. entities incorporated outside the borders of South Africa). This includes revenue declared on R&D contracts (contract R&D income) and other income received from foreign entities.
Purpose	International contract income reflects the global relevance of the CSIR. Growth in international investment is a key indicator of income diversification, as well as the relevance and impact of the CSIR within the global economy.
Performance assessment	• Performance on financial KPIs needs to be assessed in the context of the prevailing economic climate. • The CSIR considers a performance equal to and above 95% of the target as acceptable.
Data source/eligible evidence	• The information for the financial KPIs is obtained from the CSIR financial systems. • The total income received from foreign organisations, as a percentage of total income, obtained from the PeopleSoft financial system.
Data responsibility	CSIR Finance.
Method of calculation	The CSIR annual trial balance from the financial system is updated for audit adjustments and the final figures are incorporated in the CSIR annual financial statements. The annual financial statements are audited and the KPI results are derived from these audited annual financial statements.
Limitations	None.
Type of indicator	Output.
Exclusions	Licences and royalties received from foreign entities are not included in the definition of international contract income.

KPI 29: B-BBEE RATING

Indicator title	B-BBEE rating
Definition	A B-BBEE rating is a verification certificate issued by a SANAS-approved verification agency that determines the CSIR's contribution to black (as per the B-BBEE Act definition) economic empowerment.
Purpose	The indicator is a measure of the CSIR's compliance with the B-BBEE Act in its contribution to supporting socioeconomic transformation in South Africa.
Performance assessment	The CSIR would not consider failure to reach a target because of amended Codes of Good Practice targets as a negative result. Improving on the target is a successful result.
Data source/eligible evidence	B-BBEE certificate from a SANAS-approved verification agency.
Data responsibility	Legal and Compliance – Privacy office

Method of calculation	B-BBEE rating is based on a certificate that is issued after an external auditing process. The B-BBEE certificate indicates the CSIR's status regarding a number of measurements as indicated in the B-BBEE Codes of Good Practice. The B-BBEE rating is a composite score that is made up of the following components: • Management and control; • Skills development; • Preferential procurement; • Socioeconomic development; and • Equity ownership.
Limitations	The external audit ensures that there is no subjectivity in the B-BBEE assessment.
Type of indicator	Output.
Exclusions	As the CSIR is a government business enterprise, equity ownership does not contribute to the B-BBEE rating score.

KPI 30: RECORDABLE INCIDENT RATE

Indicator title	RIR
Definition	The Recordable Incident Rate (RIR) is the number of recordable incidences (or cases), multiplied by 200 000, divided by the number of hours worked. A recordable incident is a work-related injury or illness that results in one or more of the following criteria: • Death; • Loss of consciousness; • Restricted work or transfer to another job; • Days away from work; and/or • Medical treatment beyond first aid.
Purpose	• RIR indicates the effectiveness of the health and safety management system within the organisation in a year; • The CSIR SHEQ policy seeks to establish an effective, accountable and transparent framework for managing, maintaining and implementing SHEQ within the organisation.
Performance assessment	The CSIR aims to achieve its annual target of an RIR less or equal to 0.5 (equivalent to 16 recordable incidents/ cases) by identifying health and safety risks and implementing proactive health and safety interventions to reduce the number of recordable incidents/ cases.
Data source/eligible evidence	• Statistics of the recordable incidents that occurred at the CSIR, obtained from the SHEQ sub-portfolio. • Information on the health and safety KPIs is obtained from the CSIR SHEQ systems.
Data responsibility	CSIR SHEQ.
Method of calculation	The RIR is an indication of the percentage of employees exposed to work-related injury or illness and is classified as a recordable incident per year. It is calculated by the number of recordable cases multiplied by 200 000 divided by the number of hours worked.
Limitations	None.
Type of indicator	Output.
Exclusions	None.

KPI 31: AUDIT OPINION

Indicator title	Audit opinion
Definition	The Auditor-General defines a 'clean audit' as achieving an unqualified audit opinion on the audits of annual financial statements and pre-determined objectives, as well as not having material findings on the audit of compliance with laws and regulations.
Purpose	The indicator is a measure of CSIR's accountability and governance.
Performance assessment	The CSIR would like to maintain a clean audit outcome at the end of each annual audit.
Data source/eligible evidence	Report of the Auditor-General as published in the Annual Report.
Data responsibility	CSIR Finance.
Method of calculation	A clean audit is based on the overall opinion of the Auditor-General after the performance of the annual statutory audit.
Limitations	Data from the Auditor-General regarding the audit opinion are only available in the third quarter of the financial period. This KPI relates to the audit opinion of the previous financial year.
Type of indicator	Output.
Exclusions	None.

B

ANNUAL PERFORMANCE PLAN

2025/26

B1 OPERATIONAL PLAN OVERVIEW

Research, Development, and Innovation (RD&I) initiatives and projects planned for the 2025/26 period are outlined in Table B1 below. These initiatives aim to enhance technological advancements and foster collaborations with industry partners, higher education institutions (HEIs), state entities, and international organisations. Key projects include the development of the full value chain of fibre products to green automotive value chains, the synthesis of carbon nanomaterials from wastes, and the commercialisation of the Precision Agriculture Information System. Other notable projects involve the development of cannabis extraction technologies, the deployment of novel Lab-on-Chip Point-of-Care diagnostics platforms, and the advancement of local research and development into vaccines and therapeutics. Additionally, the document highlights initiatives in smart city technologies, renewable energy solutions, and intelligent transportation systems. Some specific examples of notable projects include:

- **Grow-A-Car:** Developing the full value chain of fibre products from supply to processing and product development, aimed at greening automotive value chains and localising manufacturing.
- **Carbon Nanomaterials:** Synthesising carbon nanomaterials from wastes and incorporating them into polymer matrices and advanced coatings.
- **Agroprocessing:** Developing cannabis extraction technologies and formulating innovative product types with SMMEs and big companies.
- **Smart Agriculture:** Commercialising the Precision Agriculture Information System to support precision agriculture and business decisions.
- **Vaccine Manufacturing and Innovation:** Advancing local research and development into vaccines and therapeutics.
- **Next-Generation Molecular Diagnostics:** Deploying novel Lab-on-Chip Point-of-Care diagnostics platforms for infectious and chronic diseases.
- **Smart CCTV Analytics:** Developing crime sensing technologies for SANDF bases.
- **Metalix Machine:** A high-speed laser-based additive manufacturing machine developed for commercialisation purposes.
- **Advanced Mining Technologies:** Implementing advanced technologies to improve mining efficiency and safety.
- **Smart Cities and Infrastructure:** Developing and implementing smart city technologies to improve urban living.
- **Renewable Energy Solutions:** Developing and deploying renewable energy technologies such as solar, wind, and hydrogen fuel cells.
- **Intelligent Transportation Systems:** Implementing smart transportation solutions, including autonomous vehicles and advanced traffic management systems.

The planned outputs for 2025/26 include technology development, product prototypes, and collaborations with various stakeholders.

Table B1: RD&I initiatives and projects for 2025/26

No.	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
1. Future Production: Chemicals				
1.1 Advanced materials	**Grow-A-Car:** developing the full value chain of fibre products from supply of fibre to processing and product development, to offtake, to allow for the greening of automotive value chains and localise manufacturing.	TRL 2-3.	• Supply of fibre • Offtake in automotive and potentially other markets • Product prototypes developed and accepted, with the exception of the envisioned biopolymer	• Coega Development Corporation, Eastern Cape Development Corporation, farmers co-operatives, VW, Isuzu, Brits Non-wovens, Mercedes-Benz.
	Carbon Nanomaterials and their polymer nanocomposites: The development of processes to synthesise carbon nanomaterials from wastes and incorporate them in polymer matrices, thermosets and advanced coatings. Focus is on the use of local materials	TRL 7	• Technology development and innovations will enable both the materials supply chains in SA and the industry that uses advanced materials to increase competitiveness	• Universities, filament factory, TIA.
1.2 Biomanufacturing Technologies	Grow vaccine and biomanufacturing Workforce Development in RSA and the continent to increase impact and relevance.	N/A	• Four courses per annum are provided, leading to training of ~100 people per annum. • Internships are also provided. • CSIR to be established as biomanufacturing training Hub for Southern Africa.	• GIZ • Bill and Melinda Gates foundation • KfW/European Commission • Various RSA training providers/partners: Afrigen, Biovac, UCT, Wits, UVUBio
1.3 Pharmaceutical Technologies	**Localisation of API production:** Commissioning of the flow-chemistry pilot for API production	TRL 2-6	• Publications, TDs and expressions of interest with industry partners. • The facility will be fully commissioned for translational process development and advanced intermediate production.	• Academic institutions (UP, SU, Wits and others), DSTI, National Treasury, TIA.
	Commissioning and regulatory approvals for the cGMP facility for biopharmaceutical manufacture.	N/A	• Facility will be fully commissioned and functional. • Systems and processes for cGMP operation developed. • Regulatory approval application submitted to SAHPRA.	• SAHPRA, cGMP.

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
2. Advanced Agriculture and Food cluster				
2.1 Smart Agriculture	• **Commercialisation of Precision Agriculture Information System**, a programme by the CSIR that provides farm-level data to support precision agriculture and business decisions	• TRL >7	• Taking the digital platform to the market • Trial the platform with farmers	• Private – FarmSol, InnovBiz, Wits, UKZN • Public – DSTI, TIA EDCD
2.2 Agroprocessing	• **Development of Cannabis extraction technologies** to demonstrate local applicability of such technologies and formulation of innovative product types with SMMEs and big companies	• TRL > 6	• Product formulations • Extraction of Cannabis-based active ingredients • Supporting SMMEs with product and process development	• Private – Labat, Wits, UFS • Public – DSTI, TIA, DBSB, GDARD • International
	• **Development of complementary medicines, cosmetics and food products** and assist companies navigate the IKS regulatory framework to ensure compliance and that the benefits accrued from commercialising IKS-based products accrue to the indigenous knowledge holders	• TRL > 4	• Assist communities with benefit-sharing agreements • Valorisation of indigenous plants • Identification of active ingredients in indigenous plants	• Private – THPs, Mashaba Herbs, UFS, UKZN, Univ. of Limpopo, UNDP • Public – DSTI, TIA, IDC
	• Addressing food safety to ensure compliance and population health • Food waste in a circular economy model and post-harvest management technologies	• TRL 6	• Food testing methods • Establishment of accredited testing facilities • Innovative food waste management solutions	• Private – Nozala Trust • Public – DSTI, TIA • International – French Solidarity
2.3 Food Safety Innovations	• Addressing food safety to ensure compliance and population health • Food waste in a circular economy model and post-harvest management technologies	• TRL-6	• Food testing methods • Establishment of accredited testing facilities • Innovative food waste management solutions	• Private – Nozala Trust • Public – DSTI, TIA • International – French Solidarity

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
3. NextGen Health cluster				
3.1 Vaccine Manufacturing and Innovation:	• **Established as a CDMO**, fit-for-purpose infrastructure funded through further support from National Treasury	• Various	• Outputs of local research and development advanced into vaccines and therapeutics in clinical development or commercialised • Capability to make emergency vaccine supplies • The CSIR developed prototype vaccines for Hepatitis B virus (HBV), Human papillomavirus (HPV) and Respiratory syncytial virus (RSV) going through clinical development via CSIR start-up	• DSTI is at the advanced stages of developing the Vaccine Innovation and Manufacturing Strategy (VIMS) to develop national capability to develop vaccines and biologics.
3.2 Next-Generation Molecular Diagnostics:	• **Deploy novel Lab-on-Chip Point-of-Care (LOC POC) Diagnostics Platform** for infectious and one health targets, as well as chronic disease • **Development of isothermal molecular diagnostic assays** for priority diseases (e.g. TiLV, ISKNV, Brucellosis, Bovine Tb)	• Various	• CSIR developed Lab-on-Chip devices for use in veterinary and aquaculture diagnostics fully deployed in regional markets • The POC diagnostics end-to-end capability is fully established at the CSIR	• Public – DSTI, TIA • International – Ghana, Egypt, Malawi, Brazil, India, FAO, Cefas
3.3 Tools for drug development and pharmacovigilance	• **Production of minimal viable product (MVP)** for the bioengineered liver, ACI and Digibiobank	• Project is at TRL 6 (Bioengineered liver, ACI (TRL 5), Digibiobank (TRL 3). Project will progress towards the minimal viable product (MVP)	• Outputs across the value chain are expected from publications, patents, technology demonstrators, MVP and joint technology development with industry	• DSTI, TIA, SAMRC, SAPHRA, GATES, WITS, Genentech, UCT, NHLS; Collaborators: Proteomics team

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
4. Defence and Security cluster				
4.1 Technologies for Sovereign capabilities	• Joint technology development with Air Traffic Navigation Services (ATNS), funded by TIA, to develop an advanced Passive Radar for Air Traffic Control (ATC).	• TRL6	• Maturing FM based Passive Radar for Air Traffic Control and deployment to Kruger Mpumalanga International Airport. • Development of DVB-T Signal Processor for Drone Detection. • Feasibility Study into Satellite based Passive Radar.	• Defence Industry and SANDF
	• Hydrogen Fuel Cell propulsion unit for UAVs	• TRL6	• Demonstrating power and propulsion technology through environmental testing.	• Hydrogen Society Roadmap (DSTI, and SANEDI) • Decarbonisation of the Transport/ aviation industry
	• Lightweight tactical vehicle	• TRL6	• Integration on current and new automated turret subsystem.	• Defence Industry and SANDF
4.2 National Information and Cyber Security capability	• Virtual Security Operations Centre	• TRL6	• Integrating current and new systems, conducting operational testing and evaluation (OT&E) of the integrated vehicle system and automated turret, and supporting SMMEs	• Government Departments
	• Development of RSA Public Key Infrastructure (PKI)	• TRL4	• Acquire and install hardware and software components. • Establish Certificate Authorities and Registration Authorities. • Develop a secure facility for key management and storage.	• Industry • Government

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
4. Defence and Security cluster				
4.3 Crime prevention technologies	• Cerberus	• TRL6	• Integrating more CMORE services into a scalable platform, scaling up mobile tracking services, real-time video streaming, and applying AI to collected data. • Joint technology development from the use of the base platform with an external entity. • Training of SMMEs in the development technique of using Kubernetes.	• DFFE
	• Smart CCTV Analytics project for crime sensing in SANDF bases	• TRL6	• Enhance crime sensing capabilities in SANDF bases through industry collaboration, localised technology, joint technology development, and SMME support	• EDERI/DoD/Armscor programme • Industry collaboration • SA Navy

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
5. Future Production: Manufacturing cluster				
5.1 Industrial Machinery and Equipment:	• **Metalix machine:** Metalix is a high-speed laser-based additive manufacturing machine that is developed from the learnings of the AeroSwift platform for commercialisation purposes.	• TRL8-9	• Complete commercial version machine with a large build volume of 600 x 600 x 700 mm, faster build rates, and can accommodate single or multi materials.	• Hensoldt, Metal-Heart, Anglo, and internally Defence and Security - Aeronautical Systems
5.2 Medical Devices Manufacturing and Health Sector Strategy:	• **CSIR-dtic Masterplan Collaboration:** Ongoing collaboration with **the dtic** and NT in the implementation of the MedTech Masterplan, including company engagements regarding localisation and designation of medical devices • **Umbiflow and Medical Devices Commercialisation:** CSIR-based medical device innovation in response to healthcare needs in the country/continent, also create income streams for CSIR with niche product supply. • **SMME Support:** Continue the cluster's role within the TIA/SAMRC MeDDIC Programme to support SMMEs entering the MedTech sector.	• TRL4-7	• Assessment reports on behalf of **the dtic** MedTech Master Plan process to help guide decision making on local manufacturing of medical devices identified for localisation and designation • Solid relationships with industry associations and companies to facilitate future joint development and support initiatives • Funded proposals from a diverse set of local and international funders • SMMEs supported in their product development and regulatory journeys to market, targeting companies getting into the market as a result (in part) of the support we provide. • Skills development in medical device product development • Niche contract manufacturing of medical devices	• Medical device and diagnostics innovation cluster programme (MeDDIC, funded by TIA), SA Medical Research Council, SEDA, DSBD, SABS, UP, UCT, Lodox, medical SMMEs, Gates Foundation, industry associations (SAMED and MDMSA)

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
5. Future Production: Manufacturing cluster				
5.3 Rail Technologies	• Development and Industrialisation of Rail Technologies (Various Projects)	• TRL 4 to 7	• Development of Rail Technologies to increase operational efficiency, maintenance and operational safety. The following are planned outputs: • Rail Break Detection System • Rolling Stock Derailment System • Rail Infrastructure Monitoring Platform	• Transnet Engineering, Transnet Freight Rail Operating Company, Transnet Rail Infrastructure Manager. RSR, Private Rail Operators, University of Stellenbosch, University of Pretoria, IHHA

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
6. Future Production: Mining cluster				
6.1 Decarbonisation using Green Mobility in Mining Initiative:	• Decarbonisation using Green Mobility in Mining Initiative: Development of a decarbonisation programme for the mining industry, which focuses on technologies that support green mobility.	• TRL 4-5	• Develop H2 FEED platform, which will include a demand estimator, various layers of technical information (e.g. Renewable Energy, Water Resource and potentially AMD) and high-level techno-economics for hydrogen production.	• Mining Industry
6.2 Digital Integration Platforms:	• Competency based immersive and experiential mine worker emergency response training	• TRL 7	• Operationalise the training offering. • Develop additional immersive training modules. • Develop training modules on contract for mining industry customers.	• Local training content developers (SMMEs)
	• TMM Digital Twin is a digital risk profiling tool for Open Pit and UG Mines.	• TRL 7	• Develop governance foundation for the TMM Digital Twin, such as documentation, processes and quality review. • Commercialisation related modules/ functionalities – including subscription framework, etc. • Develop additional modules: • UG module - allow for UG Mine use cases • Semi-Autonomous - for semi-autonomous vehicle enablement • Simulation - fleet management fundamental theory to support predictive functionality • Optimisation – optimisation scenario tool • Achieve TRL 8 and 9 (pursue commercialisation preparation process).	• Mining Industry

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
6. Future Production: Mining cluster				
6.2 Digital Integration Platforms:	**Eagle eye** • Machine Vision for TMM and infrastructure assessment and quantification.	• TRL 6	• Operational pilot where the technology will be demonstrated in the relevant environment. • Refine asset identification algorithms.	• Mining Industry and Minerals Council South Africa
	• Rope test data analytics/rope inspection video analytics	• TRL 4	• At least one on-mine/laboratory video monitoring trial installation to demonstrate the technology.	• Mining companies
	• Data analytics applied to rope test database and rope visual inspection video analytics for improved insights and potential prediction of rope life/ deterioration		• Data analytics insights to support rope condition monitoring and/or rope life determination as a service offering.	
	Rock Engineering Assistant • Development of a novel platform for the South African mining industry rock engineering specialists in managing and executing typical practices required in the industry. Inclusion of a few critical applications	• TRL 6	• Industry trials on selected applications to provide sufficient data to move applications to TRL6. • This will be followed by Industry Expansion as new applications are developed, with improvements of existing applications based on industry feedback.	• Mining Industry
	Digital underground auditing tool • Development of digital tools (building on available hardware technologies such as LIDAR and UWB) to be used to improve the accuracy and dependability of underground support location and rock mass quality audits.	• TRL 5	• Expansion of the rock mass quality and support location tool concepts by increasing testing applications. • Determine hardware technology specifications to allow successful application of the digital tools. • Development of software applicable to mining environment requirements to efficiently use hardware.	• Mining Industry

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
6. Future Production: Mining cluster				
6.3 Safety and Health Initiative:	• Fire and explosion survivability of installed underground safety and communication technology elements	• TRL 4	• Technology survey to establish the state of the art of fire/explosion survivability. • Literature review of test protocols/standards applicable to the field. • Develop/adopt a test protocol for the evaluation of fire and explosion survivability of equipment.	• Fire risk management operators in the mining and building industries • Mines Rescue Services
	Novel chemical canister for self-contained self-rescuer. • Development of a novel chemical canister design aimed at improving the efficiency to achieve a more compact and lightweight self-contained self-rescuer	• TRL 5	• Validation of chemical canister, as part of an SCSR unit, through selected SANS 1737 tests.	• Afrox
	Integrated Geosensing tools and risk-based mapping platform • Improve BHR and ERT service offering. • Develop UAV-GPR and GPR-LIDAR system. • Geosensing data platform utilising various • Geophysical datasets (ERT, GPR, BHR… etc) and interpreting the data for decision support.	• TRL 6	• Operational demonstration testing for an improved BHR, ERT survey service offering. • Development of a UAV-GPR platform and an integrated GPR-LIDAR capability.	• Mining companies • Mintek • Department of Defence

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
7. NextGen Enterprises and Institutions cluster				
7.1 Smart Government Services	• Enhance digital public infrastructure for integrated service delivery	• TRL3-8	• Enhancements on decision support tools for the monitoring of oceans and coasts • Implementation of a citizen participation platform for municipalities and metros • Localised cloud offering for Government • Contributions to Digital Public Infrastructure Framework (being driven by Presidency)	• DFFE, DSTI, DoD, SSA, DoT (TNPA, SAMSA), BMA, SAPS, African Union Commission, SAEON, Western African research institutes and universities. • DSTI, HSRC, UKZN, Mpumalanga Provincial Government, CoGTA, TIA, SALGA. • DHA, SITA, Presidency, DPSA, DCDT, DPME, SARS, SARB, SMMEs
	• Develop and implement digital systems to enable the National Healthcare delivery platform	• TRL6-9	• Electronic medical record; Business intelligence and data analytics platforms.	• Centre for Disease Control and Prevention (CDC), National Department of Health (NDoH), National Health Laboratory Service (NHLS)
	• Develop and implement an integrated 4IR platform to address service delivery challenges in various sectors	• TRL3-6	• Further development on electronic monitoring solution for Correctional Services • Localisation of foreign components on radiation monitoring system • Language technology solutions for basic and higher education	• DCS, Integrated Justice System. • National Nuclear Regulator (NNR). • DSAC, DBE, Macmillan Education, Unisa, DHET

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
7. Next-Generation Enterprises and Institutions Cluster				
7.2 Financial Inclusion and Intelligence	• Develop capabilities and technologies to address national financial integrity	• TRL 6-8	• Development of software solutions in the following areas: • Digital fraud detection tool based on financial transactions • Digital Asset Tax Tools • Digital Asset Fraud Detection	• Banking industry, Hawks, Investigating Directorate. • SARS, financial services providers, taxpayers, tax consultants. • Financial industry and regulators (local and global), Digital Assets industry, Policing services, Legal services
	• Promote financial inclusion and access to the digital economy	• TRL 4-5	• Develop algorithms that prioritise transparency, fairness, and non-bias decision-making in credit systems	• Fintech and banking industries, Higher education institutions focused on AI ethics, SARS, SARB, financial regulators
	• Enhance Risk Assessment and Resilience for the Insurance Sector	• TRL 9	• Digital wildfire risk quantification and pricing tool	• Insurance industry
7.3 Digital Economy Enablement	• Develop foundational digital capabilities and technologies for South Africa's digital economy	• TRL 4-6	• Foundational Digital Capabilities Research (FDCR Platform) • Immersive educational solutions, empowering individuals and businesses with the skills and knowledge they need to succeed in the digital economy	• DSTI and a range of other Govt Depts, various HEIs, ICT SMMEs, Regulators; Relevant industry stakeholders, • International, Continental and BRICS countries. • Sparcx, FCDO, Matlala Group, SMMEs in online learning
	• Increase digital access, economic participation and development for marginalised communities	• TRL 6-9	• Supporting ICASA with regulations for innovative radio frequency solutions • Technical support for a licensee of Spectrum Switch technology • Improved version of carrier-grade 5G testbed deployed with multi-vendor support • Network Infrastructure Management System (NIMS)	• Mobile Network Operators (MNOs), Mobile Virtual Network Operators (MVNOs), ICASA, SENTECH, SMMEs, Academic institutions, Communications Regulators' Association of Southern Africa (CRASA)
	• Localise technologies to build a vibrant digital economy	• TRL 4-9	• Minimal Viable Product for Voice dubbing • Research and hosting of NextGen Natural Language Processing (NLP) models • Implement progressive web EPUB3 reader • Implement language mark-up assistant to speed up synchronisation of multilingual documents	• Multichoice, SABC, Discovery. • UNISA, Lelapa AI, Angula, ReadSpeaker, Private Schools, Inclusive Solutions, Edit Microsystems, Roundafire, VSoft

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
8. Smart Places cluster				
8.1 Human Settlements, Utilities and Services	**Human Settlements, Utilities and Services SPP** • Making an impact in the lives of people by addressing key socioeconomic challenges like poor housing and inadequate access to services, through the effective application of relevant CSIR technologies, products, services, and knowledge, packaged together into 'offerings' working off well-functioning 'platforms'	• TRL 1- 4	• Concept document, stakeholder engagement plan, revised concept based on stakeholder needs, concept refinement and funding proposals, and proof of concept	• Wide array of human-settlements-focused state departments and entities at all levels, private sector industry partners, professional bodies, academic and research institutions, and non-government organisations, local and international (refer human settlements SPP stakeholder database)
	Smart Industrial Wastewater Treatment • Develop smart technologies for water and wastewater treatment to recover drinking water and valuable products	• TRL 6	• Smart Industrial Wastewater Treatment prototype developed, and research published	• Mintek, Mpact Recycling and SASOL
	Valorisation of Acid Mine Water, sustainable use of resources in the mining sector • Tailor-made a solution for the reclamation of drinking water and valuable minerals from acid mine water.	• TRL 8	• Further developed the Magnesite Softening and Reverse Osmosis (MASRO) process into a prototype and the establishment of a mobile and modular pilot plant	• Exxaro Resources, Seriti Coal Mine, UCT, Sibanye Stillwater, DWS

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
8. Smart Places cluster				
8.2 Industrial Revitalisation	**Industrial Revitalisation** • To support revitalisation and transition to sustainable, low-carbon, climate-resilient and globally competitive industry • Programme – Energy, Water, Waste and Air Quality Management.	• Various	• Concept document, stakeholder engagement, revised concept based on stakeholder needs/challenges, signed MoU agreements, and MoA on projects	• Provincial development agencies, Special Economic Zones, Eco-Industrial parks, Business Clusters in the rural and township areas, state-owned entity (SOE)
	• Industrial ecology and regenerative design tools to support the circular economy.	• TRL 6	• Finalised LCSA guideline and toolkit, to be submitted as a technology demonstrator; together with capability development in the Regenerative Economy and Circular Economy more broadly.	• International – UNEP, UNIDO, PEW • NGOs/NPOs etc. – WWF-SA, Green Cape, ACEN / Circular SA Consultants – JG Afrika, The Green House (TGH) Universities – UJ, Wits, UCT Industry – Shoprite, Unilever, Producer Responsibility Organisations SMMEs
	• Construction of a Green Cement pilot Plant	• TRL 9	• The collaboration between CSIR and Eco-Teq Cement will be concluded to scale up the operations to reach an annual output of 1800 tons of metakaolin cement blends. This will take the project to TRL 9. Thereafter, CSIR will host potential licensees at the green cement piloting facility prior to the establishment of licensee production facilities	• Industry SMMEs as potential licensees • Investors such as **the dtic**, PIC, DBSA, provincial development agencies

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
8. Smart Places cluster				
8.3 Ocean, Coastal and Marine Science and Ports Operations	**Sustainable ports** • Hybrid infrastructure for future ports and autonomous monitoring technologies supporting sustainable and efficient port operations	• Various	• Design frameworks/guidelines to inform decision-making on hybrid (environmentally friendly) infrastructure development in port, offered as a capacity development service nationally with potential regional (Africa) upscaling • Innovative autonomous metocean and water quality monitoring and evaluation services to ports (nationally and internationally) to improve overall resilience and efficiency of port operations in the face of environmental challenges and climate change impacts.	• Transnet National Ports Authority, UNEP Nairobi Convention, Port authorities (regional, continental, global)
	• Quest for Water Security	• Various	• Practical, evidence-based framework/ guideline to inform innovative solutions/ approaches to coordinate/optimise integrated water resource management (e.g. aquatic ecosystem protection, aquatic ecosystem services management, water supply management, wastewater treatment/ disposal) at a local scale in developing contexts (i.e. having to cope with limited resources), offered as a capacity development service nationally with potential regional (Africa) upscaling	• Potential Funding Markets identified for phases 1 and 2 of this projects: Global Water Partnership (GWP), EU, UNDP, UNEP, Global Environment Facility (GEF), Swedish International Development Agency (SIDA), Green Climate Fund (GCF) including other funders to potentially fund phases 2 and 3 of this projects (being World Bank, AfDB) •
	• Smart Coastal Solutions: Shores, estuaries, ports.	• Various- TRL 4- 7	• Tools (approaches, methods, frameworks) for scientific decision support to coastal planning, freshwater flows at municipal to regional scales, and to guide, assess port suitability initiative at port scale	• International – UNEP, West Indian Ocean Marine Science Association HEI- Nelson Mandella University Government/ State Entities- Transnet Port Authority, SANBI

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
8. Smart Places cluster				
8.3 Ocean, Coastal and Marine Science and Ports Operations	• Development of Digital Twins for Aquatic Research	• Various- TRL 4- 7	• Develops capabilities in satellite data and signal processing. Develops capabilities in biodiversity and wetland mapping	• International- European Union, Norwegian Research Centre (Norce) Industry- Aquaculture sector, Viking aquaculture Government- Department of Forestry Fisheries and Environment
	• Southern Ocean Carbon & Climate Observatory (SOCCO)	• TRL 5	• Publication equivalents; TD; technology licence agreement; HCD outputs	• DSTI • University of Cape Town
	• Optimisation of thermal systems	• TRL >6	• Publication, Pilot testing, market study for commercialisation	• Industry: CERAdvance, Coffee Industry

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
9. Smart Mobility cluster				
9.1 Intelligent Transport Systems and Operations	**Robotics, Artificial Intelligence and Digitalisation** • Sensor science, digital twinning, software development, data management, analysis and visualisation, GIS modelling in support of the transport industry	• TRL 4	• Integrated law enforcement management system • Traffic Control Centre Management System (TCCMS) • Infrastructure security and temper detection technologies • Heavy vehicle data analytics and reporting systems (enhanced VOMS) • Web-based Abnormal load registration and permit system • Drone technology/Satellite imagery and image analysis technology	• SMMEs: Think Ninjas, Datron • Law enforcement, RTMC • COGTA (metros, provinces, other authorities etc.)
	• Provision of public transport systems design and • creation of solutions to improve the performance • of transport network operations and associated • management systems	• TRL 5	• Traffic Conflict Tool to predict conflicts caused by road conditions, traffic flow and driver behaviour • Data platform, which will make use of large volumes of data for experimental work. • Number Plate Portal to pilot new number plate system • Report on Fluorescent Yellow Road Signs Study • Report on the Road Restraint Systems Study	• National Taxi Alliance (data collection, industry needs mapping) • South African National Taxi Council (data collection, industry needs mapping) • SA Taxi (future studies) • International Association on Public Transport (information exchange) • South African Roads Federation (contributor) • Committee of Transport Officials (invited as and when) • Centre for High Performance Computing (Internal)

Strategic Initiative	Programme/Project Description	Planned Technology Readiness Level by 31 March 2026	Planned Outputs for 2025/26	Collaborations: Industry, HEIs, other State Entities, International, Continental and BRICS Countries
9. Smart Mobility cluster				
9.1 Intelligent Transport Systems and Operations	**Transport Infrastructure Management** • Provide sustainable freight transport and sustainable infrastructure management solutions and systems	• TRL 6	• Infrastructure asset management tools (e.g. PoE, Service delivery etc.) • Struman (BMS & Public Transport Infrastructure and Reporting System) • Bridge impact assessment and Road wear analysis	• Abnormal Loads Technical Committee • Industry: Private transport operators, JG Afrika, Royal Haskoning DHV (Pty) Ltd., Mikros • SMMEs: Datron
9.2 Transport Infrastructure Engineering	**Pavement Design and Construction** • Provide sustainable road material sciences and infrastructure solutions that effectively address the accessibility, and mobility needs in support of socioeconomic development	• TRL 4	• Climate tool for bitumen selection • MDD improvement (Laser sensors) • Eskom fly ash guideline • Wet plastic guideline • Recycled Concrete Asphalt • Nano Materials Self-Healing Asphalt & Concrete Technology • SANRAL Nano modified material / alternative material (HVS testing portion. • TSS prototype is expected to reach a TRL level that is higher than 4.	• SOE: SANRAL • Local Industry, e.g. consultants, material suppliers and contractors. SANRAL Research Panel Members • Industry associations, e.g. Sabita, CCSA and ASPASA • International: IT Transport, • Universities: UP, SU, UKZN
	Coastal Engineering and Ports Infrastructure • Development of technologies and support systems that will improve the safety and efficiency of ports and protect coastal infrastructure	• TRL 7	• Waverider deployment and recovery mechanism for semi-rigid boats • Rock grading tool for physical models •	• Industry: PRDW Consulting Ports and Coastal Engineers, WSP Africa (Pty) Ltd, CSV Construction, WML Coast • SMMEs: Enuvo, ASP Tech (Pty) Ltd, Jan se Company.
9.3 National Logistics System	**Smart Logistics Management** • Enhanced functioning of the national logistics system	• TRL 5	• Stabilise technology platforms (ILIMA. Logistics Observatory) • Logistics for specific sectors (agriculture; energy) • Report on green transport	• Economists: Conningarth • SMMEs and Solution developers: ThinkNinjas, Crickmay • Sector bodies: SAAFF, BUSA • Implementation: SMMEs – Mogan Bros

Table B2: CSIR C³ initiatives and projects for 2025/26

No.	Strategic Initiative	Programme/Project Description	Planned Outputs for 2025/26
1	Accelerate Technology Commercialisation	• Provide technical, financial, and business development support to early-stage ventures, ensuring opportunities can achieve market readiness	• 15 new technologies commercialised by 2030 (3 per year) • Minimum 3-5 investments made annually for commercialisation activities
2	Increase Funding and Investment	• Actively seek partnerships with industry, government, and investors. These partnerships will be critical for both co-investment and commercialisation activities.	• Secured annual funding of R30 million to R50 million to cover first-round investments • Build a co-investment network with venture capital firms and private equity partners, aiming to attract R80million in co-investment over five years
3	Expand Strategic Partnerships	• Actively seek partnerships with industry, government, and investors. These partnerships will be critical for both co-investment and commercialisation activities.	• Forge 5+ strategic partnerships annually with industry stakeholders, government bodies, and international investors. • A network of national and international partners for licensing and investment opportunities established. Engage 5+ new international partners by 2030.
4	Strengthen the Technology Pipeline	• Sourcing, assessing, and prioritising technologies from CSIR's R&D pipeline. CSIR C³ will introduce a robust triage process to evaluate technologies, considering their commercial readiness, scalability, funding requirements, and market impact.	• Evaluate and triage 15+ CSIR-developed technologies per year • Prioritise technologies with market readiness, scalability, strong intellectual property (IP) protection, and minimal additional funding requirements.
5	Support and Nurture Investments	• Provide technical, financial, and business development support to early-stage ventures, ensuring opportunities can achieve market readiness	• Support at least 3-5 high-tech startups annually • Provide incubation services, including market access, technical support, and business mentorship, to ensure 20% of opportunities achieve key growth milestones within 3 years.
6	Build a High-Impact Investment Portfolio	• Implement well-defined exit strategies for its portfolio companies to generate significant returns on investments. These may include acquisitions, IPOs, management buyouts, or secondary sale	• Build a portfolio of at least 15 investments over five years, focusing on healthcare, manufacturing, energy, and environmental technologies. • Achieve a minimum ROI of 15% on the portfolio by the end of the five years • Establish clear exit strategies, including acquisitions, IPOs, or secondary sales for portfolio companies, with a targeted exit horizon of 5-7 years
7	Enhance Operational Efficiency	• Implement processes to enhance its capacity to manage investments, including conducting thorough due diligence, developing a business plan, creating term sheets, and securing internal approvals	• Reduction of average due diligence and investment processing time by 20%. • Digital implementation of back-office software for investment management by 2026 to enhance efficiency

B2 HUMAN CAPITAL DEVELOPMENT PLAN

B.2.1. HC ANNUAL PRIORITIES AND ROUTINE SERVICES

To achieve the fourth CSIR strategic objective (SO4), the CSIR has adopted five strategic pillars aimed at aligning the Human Capital Strategy and operational planning with the CSIR Strategy, vision, mission, and values. The human capital strategic pillars and key initiatives to deliver on the SO4 objectives for FY 2025/26 include:

a. Building a diverse talent ecosystem and a sustainable future supply of limited skills

The following key interventions are planned for 2025/26 in support of this objective.

Table B3: Building a diverse talent ecosystem and a sustainable future supply of limited skills

Key Initiative for 2025/26	Description
Talent acquisition	• The strengthening of internal capabilities for the attraction of talent, continue to be a priority for the next year and this includes continuous optimisation of recruitment sourcing strategies, including joint appointments, to achieve a competitive advantage in the attraction of new talent with skills and competencies which match the diverse internal demand of skills and competencies, required by divisions, clusters, impact areas and research groups. Implement measures to enhance candidate and employee experience.
Talent management and Succession Planning	• Talent review of the following: • CEO succession plan for Board approval. • CEO's direct reports succession plans for HRSEC and Board noting. • Cascading of talent and succession management to lower levels. • Enhancements and automation of the process.
Enhancing pipeline development programmes	• Continuation of pipeline development programmes to stimulate and attract learners and students to CSIR human capital development programmes. • Improve return on investment in HCD programmes by ensuring good performance and facilitating absorption of pipeline • Expand human capital development programmes through partnerships with external stakeholders
Learning and development (L&D) programmes	• Continue LMDP programme partnerships with business schools and the eLearning platform service provider. • Work towards the accreditation of the CSIR as a training service provider through the QTCO and relevant SETAs. • Secure workplace approval for technical training through relevant SETAs.
CSI programme	• Partnership with relevant stakeholders to upgrade school facilities in offering a conducive learning environment as well as providing tutoring.
Alumni programme	• Focus on rolling out the planned activities as per plan and focus on delivering impact through the alumni programme initiatives. The planned initiatives include mentorship of the Entrepreneurship Development Programme candidates, the alumni newsletter and the establishment of the alumni committee.

b. Strengthening leadership and deepening professionalism

The following key interventions are planned for 2025/26 in support of this objective:

Table B4: Strengthening leadership and deepening professionalism

Key Initiative for 2025/26	Description
Embedding the CSIR People Strategy	• Embedding the CSIR People Strategy is a key priority for 2025/26 FY.
Targeted development programmes for critical staff	• Continue with the implementation of researcher development programmes. The implementation of these programmes will be continued in 2025/26, to strengthen the capacity at this level and focus on transformation, these include accelerated researcher development programmes, mentorship, staff bursaries.
Implement revised career ladders	• The automation of the experience navigator and linking to learning interventions. • Monitor the implementation of the revised career ladders.
Develop exchange programmes with universities and industry	• Continue to incorporate exchange programmes with the existing partnerships and stakeholders of the CSIR to ensure sharing and transferring of skills.
Employee relations	• Continue with employee relations capacity and capability building initiative, which are based on relevant legislation, policies and process, to empower managers understand and manage employee relations process effectively and expeditiously.
Employee relations	• Continue with employee relations information sharing an employee awareness initiative, based on relevant legislation, policies and procedures, to empower employees understand and appreciate employee relations processes.
Employment Equity	• The implementation of the Employment Equity Plan and achieving the set Targets.

c. Improving individual and organisational performance

The following key interventions are planned for 2025/26 in support of this objective:

Table B5: Improving individual and organisational performance

Key Initiative for 2025/26	Description
Employee value proposition	• Implement Total Rewards Statements as personalised communication tool to illustrate the monetary and non-monetary offerings to employees.
Performance management	• Further refinement of the 360° feedback questions to create a clearer link to the CSIR's values.
Employee engagement	• Focus on increasing employee engagements as a key driver for increased performance, productivity, and collaboration towards excellence will continue in the next year. • Rolling out of the second climate survey for the CSIR.
Reward and recognition	• Develop long term incentive scheme as a strategic management tool to promote attraction and retention of talent.
Employee benefits	• Ongoing campaigns and webinars to create awareness and educate employee on employee benefit offerings.

d. Increased efficiency and effectiveness of HC systems and processes

The following key interventions are planned for 2025/26 in support of this objective:

Table B6: Increased efficiency and effectiveness of HC systems and processes

Key Initiative for 2025/26	Description
Employee Value Proposition	• Implement Total Rewards Statements as personalised communication tool to illustrate the monetary and non-monetary offerings to employees.
Performance management	• Further refinement of the 360° feedback questions to create a clearer link to the CSIR's values.
Employee engagement	• Focus on increasing employee engagements as a key driver for increased performance, productivity, and collaboration towards excellence will continue in the next year. • Rolling out of the second climate survey for the CSIR.
Rewards and recognition	• Develop long term incentive scheme as a strategic management tool to promote attraction and retention of talent.
Employee benefits	• Ongoing campaigns and webinars to create awareness and educate employee on employee benefit offerings.

e. Advancing women, youth and people with disabilities

The following key interventions are planned for 2025/26 in support of this objective:

Table B7: Advancing women, youth and people with disabilities

Key Initiative for 2025/26	
Attraction and retention of female researchers	• Implementation of the developed attraction and retention framework concepts with the intention of reducing turnover of critical staff, including black and female researchers. • Continuation of Women's Forum to keep female employees engaged whilst ensuring a conducive environment for success.
Advancement of people with disabilities	• Continuing to focus on the advancement of people with disabilities as per the CSIR's Employment Equity Plan. Youth outreach with focus on PWD schools/ associations, priority for YES programme.
Women, men and youth forums	• Continue leveraging on the women's forum to support women's development agenda and implementing initiatives developed by women for a conducive working environment. • Continue with men's forum to address GBV issues, attitudes and psychosocial issues.

B3 FINANCIAL PLAN

The CSIR implemented its new strategy geared to deliver on the mandate and specifically, to support industrialisation during 2019/20. While the South African economy has experienced a recovery to pre-Covid-19 pandemic levels, the negative impact of the pandemic on the organisation's plans to diversify its revenue by increasing private and international sources of income remains evident. The initial plan was for income from the local private and international sectors to each contribute 15% of total revenue by the 2023/24 financial year. However, actual contributions were 8% and 10%, respectively, at the end of the period. Despite not meeting this target, significant progress was made in implementing the strategy. Over the past five years, income from the private and international sectors increased by 28% and 142%, respectively, while total income grew by 16%, even as the Parliamentary Grant decreased by 6% during the same period. The emphasis on increasing revenue streams from the private and international sectors aims to mitigate the financial risks associated with heavy reliance on public sector allocations, especially considering the strain on public finances. This will remain a key priority for the organisation moving forward to ensure financial resilience. In addition, diversification is expected to be driven by the recently implemented commercialisation strategy, which aims to derive more benefit from IP and technology that has been developed.

Several risks were considered in the development of the 2025/26 Financial Plan. The fiscal risks within South Africa are largely unchanged since the 2023/24 budget. They include weaker-than-expected economic growth, which would slow revenue growth, widen the budget deficit, and increase borrowing costs. At the same time, the wage increase in 2025/26 will continue to place significant pressure on national and provincial budgets. Furthermore, the sustained deterioration in the balance sheet of major public-sector institutions poses a risk to the fiscus. The country continues to grapple with a high unemployment rate, and persistent structural challenges, including inefficiency in key sectors such as energy and transportation. Moreover, persistent power cuts, and deteriorating rail and port infrastructure, have contributed to a weaker domestic outlook. Based on this revenue from the public sector has been budgeted to increase with 3.5% in total.

Geopolitical unrest, driven by the ongoing Ukraine-Russia war and tensions in the Middle East, coupled with the outcomes of the recent U.S. elections, has led to significant uncertainty in the international sector. As a result, we have budgeted for a decline of 0.6% in international income for the new financial year.

The CSIR is budgeting for a net loss of R30.8 million for the 2025/26 financial year. In light of uncertainty around further reductions in the Parliamentary Grant (PG) over the Medium-Term Expenditure Framework (MTEF) period, the organisation has adopted a conservative approach, budgeting for a profit of R5.5 million in 2026/27 (revised from a previously forecast loss of R48.5 million) and R15.9 million in 2027/28 (revised from a previously forecast loss of R46.8 million).

The CSIR is cautiously projecting profits from 2026/27 onwards through a concerted focus on increasing contract income and containing operational costs. Conservative balance sheet practices, including diligent working capital and cash flow management, remain crucial to ensuring the organisation can invest in the scientific equipment and infrastructure necessary to achieve its strategic objectives.

All financial resources are managed and invested in alignment with the organisation's mandate.

The decline in Parliamentary Grant

The CSIR receives its Parliamentary Grant (PG) allocation from the state, as outlined in Vote 35 on Science and Innovation, which is part of the Estimates of National Expenditure presented to Parliament by the Minister of Finance during the annual Budget Speech. However, over the years, the significant and sustained reduction in the PG allocation has had far-reaching consequences. This reduction has affected a wide range of initiatives including skills development, infrastructure investment, capability building, technology development, investment in ICT systems, support capacity, market-facing solutions, and commercialisation efforts. As a result, the organisation's ability to scale and accelerate its impact on industry and contribution to a capable state has been severely hindered.

The decline in the PG allocation remains a pressing concern. To fulfil our developmental mandate effectively, adequate financial support is crucial. The ongoing reductions in funding jeopardise our ability to execute this mandate and poses a long-term risk to the organisation to remain relevant in the future. Annually, the Department of Science, Technology and Innovation (DSTI) confirms the Medium-Term Expenditure Framework (MTEF) PG allocation to the organisation in a letter addressed to the Chairperson of the Board. This allocation consists of two components: the PG Baseline Allocation and a ring-fenced portion designated for specific programmes or projects that the organisation implements on behalf of the DSTI. The PG allocation represents the organisation's largest single funding source. The preliminary Baseline PG allocation for the 2025/26 financial year has only been increased by 3.3% when compared to the 2024/25 confirmed allocation, or a reduction of 1.4% in real terms based on the International Monetary Fund December 2024 CPI forecast of 4.7%.

Despite the rising operational costs inherent to running a complex research, development, and innovation (RD&I) enterprise—particularly one that demands world-class talent and capital-intensive infrastructure—the organisation's baseline PG has steadily declined. It has declined from 29% of total revenue in 2018/19 to 22% of the budgeted revenue in 2025/26. The baseline Parliamentary Grant (PG) allocation for the 2025/26 financial year was reduced by R127.3 million (R110.7 million excluding VAT) from the initial MTEF letter, bringing the baseline to R702.1 million (excluding VAT). This is lower than the R730.83 million (excluding VAT) received in 2018/19.

When adjusted for inflation, which averaged 6%, the baseline allocation should have grown by 42% over the period from 2018/19 to 2025/26. Instead, it has declined by 4%, highlighting the significant erosion of funding in real terms.

The indicative baseline Parliamentary Grant (baseline PG) allocation for 2025/26 has been increased by 3.3% in comparison to the 2024/25 amount, which was a decrease of 6.85% against the 2023/24 allocation. The 2025/26 figure of R702.1 million excluding VAT (R807.4 million including VAT) is higher than the allocation for the 2024/25 financial year of R679.7 million (R781.7 million including VAT), however, in real terms, this has decreased even further due to inflation and the numerous budget cuts that were affected by the DSTI/NT over the past few years. This decline in real terms in the baseline PG allocation remains a concern since the execution of our developmental mandate should always be adequately supported. It is of vital importance that the State continues to fund the R&D space and not see it as an expense, but rather as an investment into the future. Many successful countries have achieved their success through the continued investment in R&D In this regard, it would be beneficial if the PG allocation was positively reconsidered going forward.

In addition, CSIR would like to become the partner of choice for providing R&D activities to other State-owned entities, Government Departments and Municipalities, in line with its Mandate. In this regard, the support of the National Treasury is crucial to achieving this stated objective.

Adverse economic conditions—such as lower budget votes for government departments and public entities, as well as reduced discretionary spending in the private sector—have further constrained the organisation's ability to fund its baseline R&D activities and offset costs associated with maintaining a relevant, world-class capability base. Despite the need to diversify income streams, there is a minimum baseline required to maintain the core capability. Meanwhile, costs for critical services, such as licences, electricity, and insurance, have seen double-digit increases due to external factors, including the weakening of the ZAR to the USD, climate change and government-approved ESKOM price hikes.

The financial uncertainty exacerbated by the Covid-19 pandemic has forced the CSIR to adopt an aggressive cost-containment strategy. While this has led to savings, it has also restricted investment in critical infrastructure, IT systems, and support capacity, severely impacting the organisation's ability to function effectively.

Capability development, human capital development and infrastructure investments are critical to the success of the new strategy. More government investment is required to respond more effectively to support various prioritised industry sectors with technology solutions.

The organisation plays a pivotal role in South Africa's economic development, contributing to poverty alleviation, job creation, and the reduction of inequality. It also strives to elevate itself to world-class status while strengthening its financial position. Continuous investment in the modernisation and enhancement of infrastructure is essential to sustaining the organisation's capabilities.

However, much of the organisation's infrastructure is ageing, with several buildings exceeding 70 years in age bringing it within the scope of section 34 of the National Heritage Resources Act (NHRA) requiring a permit for any alteration of any structure or part of a structure which is older than 60 years. Beyond the regulatory hurdles, many heritage buildings feature building materials that haven't been used in over a century. Such materials are not designed to withstand the abuse that contemporary physical and chemical construction tools cause. In many cases, these building materials are also irreplaceable and burdens the maintenance load significantly. As a result, there is now a maintenance backlog of over R300 million, which increases to R1.5 billion over the next 10 years to attend to basic infrastructure maintenance, remaining functional and compliant. Any halt in infrastructure projects would exacerbate this backlog and could lead to challenges in managing the organisation's assets effectively, ultimately affecting overall business performance.

Furthermore, without modern, world-class infrastructure, the CSIR risks being unable to produce globally recognised research outcomes, which is essential to maintaining its reputation as a leading research institution. The organisation's ability to attract and retain young talent is also hampered by aged and aesthetically tired infrastructure, which undermines its appeal to emerging researchers and professionals. Additionally, the ageing infrastructure places a heavy burden on the CSIR's operational budget due to the high costs associated with maintaining older facilities.

Moreover, many of these infrastructure projects are vital for compliance with municipal regulations, bylaws, accreditation bodies and insurance requirements. Delays or neglect in these projects could place the organisation at risk, potentially leaving certain structures uninsured against disasters such as fires or explosions. It is thus imperative that funding is made available to maintain our facilities. The lack of infrastructure investment is forcing CSIR to rent out more of our buildings, which comes with its own complexity, resourcing and risk in an attempt to generate income for basic infrastructure re-investment.

The CSIR has targeted strategic capability development in precision agriculture, personalised medical health care products, digital mining safety technologies, localised drug manufacturing platforms, logistics and biomanufacturing over the last 5 years. These have attracted interest of our stakeholders but required CSIR investment to mature these capabilities in their early stages. The reduction in PG places at risk the CSIR's ability to target strategic investments in new areas in the future, including pandemic preparedness, disaster response, artificial intelligence, energy, mining, manufacturing and climate change amongst others.

Lastly, an unintended consequence of increasing the burden on the SET base to raise contract income is that it reduces their available time to focus on developing future facing, relevant capabilities for the benefit of the public sector and industry. Increased short term commercial focus, pivoting existing capabilities to the detriment of future facing capabilities will gradually erode the organisation's relevance over time. Therefore, it is vitally important to maintain a consistent growing baseline of PG to ensure that the organisation remains aligned with its core mandate.

Should further cuts against the Parliamentary Grant for the organisation be implemented, the Financial Plan will have to be revisited.

B.3.1 REVENUE GROWTH

The CSIR has budgeted for the year 2025/26 an increase of 2.8% in total operating revenue on 2024/25 forecast (see Table G1). Contract income increases by 2.6% and baseline grant funding increases by 3.3% on a comparative basis (i.e., budget 2025/26 vs 2024/25 forecast).

Income from the South African public and private sectors are budgeted to increase by 3.5% and 1% respectively when compared to the 2024/25 forecast while international contract income is budgeted to decrease by 0.6% when compared to 2024/25 forecast.

All necessary efforts are set to generate maximum possible revenue from the opportunities in the sectors that the CSIR supports.

B.3.2 EXPENDITURE

Total expenditure is budgeted to increase in 2025/26 by 1.7% on 2024/25 forecast. Employee remuneration costs and operating expenses are projected to increase by 2.7% and 7.9%, respectively. However, depreciation is expected to decrease by 58% due to the conclusion of grant-funded contracts.

The increase in employee-related costs is determined by taking into consideration the human capital development costs, annual cost of living adjustment, as well as the growth projections on contract income. All planned recruitment will be dependent on the securing of contracts, and stringent resource planning of critical required skills within the CSIR that would enable delivery against the CSIR mandate.

The budget for operating expenses is determined by considering contract-specific expenses (directly associated with contract income) as well as operational and functional indirect costs (inherent in running the business).

The CSIR continues to enforce cost containment measures that have been implemented across the organisation.

B.3.3 ROYALTY INCOME

Royalty income is budgeted at R2.0 million and is based on current registered licence agreements and is expected to increase by 5% against the 2024/25 forecast.

B.3.4 FINANCIAL SUSTAINABILITY

The CSIR is budgeting for a net loss of R30.8 million for the 2025/26 financial year.

In light of uncertainty around further reductions in the Parliamentary Grant (PG) over the Medium-Term Expenditure Framework (MTEF) period, the organisation has adopted a conservative approach, budgeting for a profit of R5.5 million in 2026/27 (revised from a previously forecast loss of R48.5 million) and R15.9 million in 2027/28 (revised from a previously forecast loss of R46.8 million).

Table G1 in Appendix G. provides the high-level CSIR statement of comprehensive income reflecting the forecast for 2024/25, the budget for 2025/26 and estimates for 2026/27 as well as 2027/28. A summary of parliamentary grant income for the MTEF period is provided in Table G7 in Appendix G.

B.3.5 STATEMENT OF FINANCIAL POSITION

A CSIR statement of the financial position for the MTEF period is provided in Table G2 in Appendix G.

One needs to consider the budgeted current assets of R1.72 billion and cash balance of R1.1 billion in conjunction with the current liabilities of R1.41 billion. The current ratio (current assets/current liabilities) is maintained at 1.22.

B.3.6 INVESTMENT IN PROPERTY, PLANT AND EQUIPMENT

The budgeted investment in property, plant and equipment for the 2025/26 financial year is R 164.7 million (Table G5). This includes grant assets of R64.2 million. As previously mentioned, the decline in Parliamentary Grant has a significant impact on the organisation's capacity to invest in world-class equipment.

Notwithstanding the fact that an item is included in the property, plant and equipment budget, the investment remains subject to approval as per the Approval Framework of the CSIR and additional considerations such as strategic alignment, return on investment and available cash flow.

B.3.7 CSIR SUBSIDIARY AND AUTHORITY TO ISSUE GUARANTEE INSTRUMENTS

As depicted in the diagram below, the CSIR has only one wholly owned subsidiary (CSIR C^3 SOC LTD, previously known as Technifin SOC Ltd) which is an insignificant portion of the total Group's budget to date.

In October 2023, the CSIR C³ subsidiary was launched as a stand-alone, special-purpose technology commercialisation vehicle to commercialise and industrialise technologies and the intellectual property (IP) that the organisation generates. The enterprise is a 100% owned CSIR company that holds, trades and commercialises CSIR-developed technology. It is a dedicated capability to commercialise CSIR technologies at pace and scale, acting as an accelerator to license and help incubate high-tech start-ups developed from CSIR intellectual property.

The CSIR has obtained National Treasury approval to issue guarantee instruments not exceeding the above set limits. This approval is set to expire on 31 March 2027. The approval was granted under the following conditions:

- CSIR to submit quarterly reports to National Treasury on utilisation of the annual limit;
- CSIR's liquid assets may not fall below R1.47 billion while the approval is in effect;
- CSIR is to report disputes and/or contraventions related to contracts for which an authorised guarantee is attached; and
- The Board approved limits are provided in Table G8 in Appendix G.

B4 ANNUAL AND QUARTELY TARGETS 2025/26

Table B8: Phased quarterly KPI targets for 2025/26

KPI		Q1 2025/26	Q2 2025/26	Q3 2025/26	Q4 2025/26
SO1:	**Conduct RD&I of transformative technologies and accelerate their diffusion**				
KPI 01:	Publication equivalents	56	129	227	**300**
KPI 02:	New priority patent applications filed	0	1	3	**6**
KPI 03:	New patents granted	0	1	4	**9**
KPI 04:	New technology demonstrators	0	11	25	**58**
KPI 05:	Number of technology licence agreements signed	0	1	2	**14**
SO2:	**Improve the competitiveness of high-impact industries to support South Africa's re-industrialisation**				
KPI 06:	Number of localised technologies	0	0	5	**10**
KPI 07:	Number of joint technology development agreements being implemented for industry	3	8	15	**33**
KPI 08:	Number of SMMEs supported	15	33	54	**115**
SO3:	**Drive the socioeconomic transformation through RD&I, which supports the development of a capable state**				
KPI 09:	Number of reports contributing to national policy development	1	5	8	**17**
KPI 10:	Number of standards delivered or contributed to support the state	0	1	1	**9**
KPI 11:	Number of projects implemented to increase the capability of the state	13	33	68	**117**
SO4:	**Build and transform HC and infrastructure.**				
KPI 12:	Total SET staff	1 525	1 535	1 542	**1 642**
KPI 13:	Percentage of SET staff who are black	69%	69%	69%	**72%**
KPI 14:	Percentage of SET staff who are female	37%	37%	38%	**40%**
KPI 15:	Percentage of SET staff with PhDs	17%	17%	18%	**19%**
KPI 16:	Total Chief Researchers	17	18	19	**20**
KPI 17:	Percentage of chief researchers who are black	23%	25%	25%	**30%**
KPI 18:	Percentage of chief researchers who are female	20%	20%	20%	**20%**
KPI 19:	Total principal researchers	178	179	181	**195**
KPI 20:	Percentage of principal researchers who are black	36%	36%	40%	**40%**
KPI 21:	Percentage of principal researchers who are female	20%	21%	22%	**23%**
KPI 22:	Number of staff involved in exchange programmes with industry	19	22	26	**31**
KPI 23:	PPE investment (Rm)	36	105	130	**165**

SO5: Diversify income, maintain financial sustainability and good governance					
KPI 24:	Total income (Rm)	656	1460	2251	**3207**
KPI 25:	Net profit/(loss) (Rm)	(113.9)	(104.8)	(132.7)	**(30.8)**
KPI 26:	South African public sector income (% total income)	56%	56%	57%	**59%**
KPI 27:	South African private sector income (% total income)	6%	8%	8%	**8%**
KPI 28:	International contract income (% total income)	11%	11%	11%	**11%**
KPI 29:	B-BBEE rating	1	1	1	**1**
KPI 30:	Recordable incident rate	≤0.3	≤0.3	≤0.3	**≤0.3**
KPI 31:	Audit opinion	N/A	N/A	N/A	**Unqualified audit opinion**

C

GOVERNANCE STRUCTURES

C1 THE CSIR BOARD AND COMMITTEES

The Executive Authority of the CSIR is the Minister of Science, Technology and Innovation. The Accounting Authority of the CSIR is the CSIR Board, duly appointed by the Minister. The Practice Note issued by NT dealing with the Submission of Corporate Plans requires the inclusion of the following in the Corporate Plan: The Executive Authority of the CSIR is the Minister of Science, Technology and Innovation. The Accounting Authority of the CSIR is the CSIR Board, duly appointed by the Minister. The Practice Note issued by NT dealing with the Submission of Corporate Plans requires the inclusion of the following in the Corporate Plan:

- The composition of the CSIR Board and its subcommittees; and
- The members of the Executive Management team.

C.1.1 CSIR BOARD

The members of the CSIR Board are:

- Vuyani Jarana (Chairperson)
- Prof. Arnold van Zyl
- Dr Thulani Dlamini (CEO)
- Jules Newton
- Dr Vuyo Mthethwa
- Mahesh Fakir
- Dr Christine Render
- Prof. Yunus Ballim
- Maleke Matolong
- Mike Mulcahy
- Michelle Govender

The CSIR Board has three sub-committees, namely, the Research, Development and Industrialisation Committee, the Audit and Risk Committee and the Human Resources and Social and Ethics Committee (HRSEC). The members of these committees are as follows:

Research, Development, and Industrialisation Committee

- Prof. Arnold van Zyl (Chairperson)
- Dr Christine Render
- Prof. Yunus Ballim
- Mahesh Fakir
- Jules Newton
- Michelle Govender

Audit and Risk Management Committee

- Mike Mulcahy (Chairperson)
- Maleke Matolong
- Prof. Arnold van Zyl
- Michelle Govender

HR and Remuneration Committee

- Dr Vuyo Mthethwa (Chairperson)
- Jules Newton
- Prof. Yunus Ballim
- Prof. Arnold van Zyl

Additional details on each Board member are provided in Table C1 below.

Table C1: Details of CSIR Board members

Age	Gender	Race	Qualifications	Years	Position(s) on other Boards
Vuyani Jarana (Chairperson)					
53	Male	Black	**University of Stellenbosch:** • Master of Business Administration • Honours degree in Business Administration **University of Transkei (Walter Sisulu University):** • Bcom Economics Business Commercial Law **University of South Africa** • Advanced Executive Programme **Olifantsfontein College** • Diploma in Telecommunications Institution	2	**Non-Executive Director:** • ECDC • Teconica Telecommunications • Cricket South Africa **Executive Director:** • Ilitha Telecommunications • Ilitha Infrastructure (Pty) Ltd • Jarana Investment Holdings **Council Member:** • Walter Sisulu University **Related party company (Spouse)** • JBV Consulting Agency
Dr Thulani Dlamini (CEO)					
54	Male	Black	**University of the Witwatersrand:** • PhD Chemistry, Catalysis • BSc (Hons) Chemistry • BSc Chemistry **University of South Africa:** • Master of Business Leadership	7	**Council Member:** • National Advisory Council on Innovation **Board Member:** • Industry Advisory Board of the Faculty of Engineering and Built Environment: Wits University • United Nations Development Programme South Africa **Director** • Stellar Ventures
Prof. Arnold van Zyl					
65	Male	White	**University of Cape Town:** • PhD (Engineering) • MSc (Engineering) • BSc (Engineering)	2	• None
Prof. Yunus Ballim					
67	Male	Indian	**University of the Witwatersrand:** • PhD (Chemistry, Catalysis) • MSc (Engineering) • BSc (Civil Engineeing)	2	**Trustee:** • Gallagher Foundation Trust **Chair of Council:** • Umalusi

Age	Gender	Race	Qualifications	Years	Position(s) on other Boards
Dr Christine Render					
67	Female	White	**Leeds University (England):** • PhD (Chemical Engineering) • BSc Hons. (Chemical Engineering)	6	**Partner:** • Owner Team Consultation Pty (Ltd)
Dr Vuyo Mthethwa					
56	Female	Black	**University of KwaZulu-Natal:** • PhD (Higher Education Governance) • MSocSci (Industrial and Labour Studies) • BSocSc (Honors) • BSocSci **Stellenbosch University:** • Certificate Programme in Labour Dispute Resolution Practice *Cum Laude*	6	**Deputy Vice-Chancellor: People and Operations** • Durban University of Technology
Mahesh Fakir					
63	Male	South African Indian	**University of London:** • MSc (Development Finance) **University of Durban – Westville:** • Master of Business Administration • MSc (Civil Engineering) **University of Natal:** • Post Graduate Diploma in Civil Engineering • BSc (Civil Engineering) **ML Sultan Technikon:** • National Diploma (Electrical Engineering) **Professional Registration Engineering Council of South Africa (ECSA)** • Registered Professional – Engineer	2	**Non-Executive Director:** • Chairperson: South African Maritime Safety Authority (SAMSA) • Sanral **Employee** • National Treasury – Technical Advisor
Jules Newton					
56	Female	White	**University of the Witwatersrand:** • BA (Education)	2	**Non-Executive Director:** Inhlabathi Pty (Ltd) **Trustee:** Jeppe Trust **Executive Director, Shareholder:** Newton van Rensburg Properties

Age	Gender	Race	Qualifications	Years	Position(s) on other Boards
Maleke Matolong					
46	Male	Black	**North West University** • Master of Business Administration • Bcom Accounting **University of South Africa** • Short Learning Programme in Project Management • Programme in Entrepreneur and Small Business Management **Professional Registrations** • Southern African Institute of Business Accountant (SAIBA) BAP (SA) • The Chartered Institute of Government Finance, Audit and Risk Officers (CIGFARO) Associate member	2	**Rustenburg Municipality –** • Audit Performance Committee (APC)
Mike Mulcahy					
41	Male	White	**University of Cape Town Graduate School of Business:** • MPhil (Development Finance) **University of Cape Town** Bachelor of Business Science with Honours in Economics	2	**Non-Executive Director** The International Cleantech Network **Executive Director** • The GreenCape Sector Development Agency • K2024072063 (SA) NPC - Neighbourhood Security NPO
Michelle Govender					
38	Female	South African Indian	**University of KwaZulu-Natal:** BSc (Electrical Engineering) **University of South Africa:** Post Graduate Diploma: Applied Risk Management **Professional Certifications** **Engineering Council of South Africa** Professional Engineer **Gordon Institute of Business (GIBS)** Leaders of Entrepreneurship Networks	2	**Chief Executive Officer** Octarity Pty (Ltd)

C.1.2 EXECUTIVE MANAGEMENT

To ensure streamlined decision making with a single point of accountability, and to address the multiple efficiency challenges of the aligning of strategy and operations, alongside the need to align strategic partnerships with our investment strategy, innovation strategy and operations, the CSIR Executive portfolios have been consolidated and are structured as follows:

- Chief Executive Officer: Dr Thulani Dlamini
- Finance – Chief Financial Officer: Estee Opperman
- Business Excellence and Integration – Group Executive: Dr Kaven Naidoo
- Advanced Chemicals and Life Sciences – Divisional Group Executive: Dr Rachel Chikwamba
- Advanced Production and Security – Divisional Group Executive: Dr Motodi Maserumule
- Smart Society – Divisional Group Executive: Dr Sandile Malinga
- Human Capital and Communication – Group Executive: Andile Mabindisa
- Legal Compliance and Business Enablement – Group Executive: Advocate Esmé Kennedy.

Table C2: Details of CSIR Executive Committee Members

Age	Gender	Race	Qualifications	Years	Position(s) on other Boards
Dr Thulani Dlamini Chief Executive Officer					
54	Male	Black	**University of the Witwatersrand:** • BSc Chemistry • BSc (Hons) Chemistry PhD Chemistry, Catalysis **University of South Africa:** • Master of Business Leadership	10 years 1 month	**Council Member:** • National Advisory Council on Innovation **Board Member:** • Industry Advisory Board of the Faculty of Engineering and Built Environment: Wits University • United Nations Development Programme South Africa **Director** • Stellar Ventures
Adv. Esmé Kennedy – Group Executive: Legal, Compliance and Business Enablement					
47	Female	White	**University of Pretoria:** • B.Proc **Potchefstroom University:** • LLB • LLM (Import and Export Law) **High Court of South Africa:** • Admitted as an Advocate **General Council Bar of South Africa:** • Admitted as a member of the Johannesburg Bar **North-West University: Potchefstroom Business School:** • Master of Business Administration	6 years 2 months	**Trustee:** • CSIR Pension Fund (Chairperson) **Non-Executive Director:** • CSIR C^3 **Professional Membership:** • Institute of Directors S.A.

Age	Gender	Race	Qualifications	Years	Position(s) on other Boards
Andile Mabindisa – Group Executive: Human Capital and Communication					
55	Male	Black	**University of Natal:** • Bachelor of Social Sciences • University of Natal B Soc Sc (Hons) • Postgraduate Diploma in IR	5 years	None
Dr Motodi Maserumule – Divisional Group Executive: Advanced Production and Security					
57	Male	Black	**Rensselaer Polytechnic Institute (USA)** • PhD Mathematics **Clark Atlanta University** • MSc Mathematics. Applied Math **Morris Brown College** • BSc Mathematics **IMD, Lausanne, Switzerland** • Mastering Technology Enterprise **SA National Defence College** • Executive National Security Programme	5 years 8 months	**Director:** • Akubra Trading **Professional Membership:** • Institute of Directors S.A. • Society of Industrial and Applied Mathematics
Estee Opperman – CSIR Chief Financial Officer					
43	Female	White	**University of Pretoria** • BCom (Accountancy Science) • Cert (Accounting Science) • BCom (Hons) Accounting Sci **Chartered Accountant:** • South African Institute of Chartered Accountants (SAICA)	12 months	**Deputy Chairperson/Trustee** • CSIR Pension fund
Dr Kaven Naidoo – Group Executive: Business Excellence and Integration					
48	Male	Indian	**University of the Witwatersrand:** • PhD Aeronautical Engineering • BSc Aeronautical Engineering **University of Pretoria** • BEng Honours Mechanical Engineering **South African National Defence College** • Executive National Security Programme	2 years 1 month	**Director** • The Impact Catalyst **Director** • Students for the Exploration and Development of Space South Africa NPC **Director** • Enterprise K2020192513 (STEM Education)

Age	Gender	Race	Qualifications	Years	Position(s) on other Boards
Dr Rachel Chikwamba – Divisional Group Executive: Advanced Chemicals and Life Sciences					
57	Female	Black	**University of Queensland** • M.Sc (Agricultural studies) Iowa State University • PhD (Genetics) **Gordon Institute of Business Science:** • Master of Business Administration	13 years	**Advisory Council Member:** • Australian Center for International Agricultural Research (ACIAR) **Non-executive Director:** • Wits Health Consortium (Pty) Ltd **Member:** • Persomics AB Board • CGIAR Board membership **Member:** • African Union (AU) high-level committee on Science, Technology and Innovation Strategy for Africa 2024 (STISA 2024) **Director:** • Gauteng Provincial Government (GPG) 4th Industrial Revolution (4IR) Advisory Panel
Dr Sandile Malinga – Divisional Group Executive: Smart Society					
57	Male	Black	**Rhodes University:** • PhD in Physics • **The Netherlands Business School:** Master of Business Administration	2 years 2 months	**Director:** • Innovserve

D

RISK MANAGEMENT PLAN

D1 CSIR RISK MANAGEMENT PLAN

D.1.1 RISK MANAGEMENT PHILOSOPHY

The CSIR maintains a broad view of risk as any event, positive or negative, that could affect its ability to achieve its mandate, mission, vision, and strategic objectives.

The CSIR acknowledges that risk, in one form or another, is present in virtually all its endeavours, and that successful risk-taking is necessary to achieve business strategic objectives and goals. Therefore, CSIR does not seek to eliminate all risk but seeks to be risk-aware as opposed to risk-averse, and to effectively manage the uncertainty inherent in its environment as well as pursue diverse opportunities presented by the risks.

CSIR seeks to identify, understand, assess, and respond to the risks and opportunities faced, considering their impact on the CSIR's resources, reputational standing, compliance requirements, financial position and performance. Furthermore, the CSIR seeks to pursue prudent risks or opportunities that it believes will generate sufficient and sustainable performance and value, avoid intolerable risks, manage residual risk within defined and desired levels, and be prepared to respond to risks or appropriate opportunities when necessary.

CSIR Executive Committee (Exco) and the CSIR Board of Directors (BoD), acting through the Audit and Risk Committee of the Board (ARC), will assess the CSIR's risk philosophy on an annual basis, as well as report and implement any recommended and approved changes.

To eliminate uncertainty amongst employees and stakeholders about the policies and procedures that shape the CSIR's approach to risk management, CSIR has developed and implemented a Risk Management Plan (RMP). A risk appetite and tolerance guideline aligned with the RMP will continuously be assessed and defined in support of the strategic objectives and operating landscape of the CSIR.

D.1.2 PURPOSE OF THE RMP

The RMP is developed to support the successful implementation and achievement of the overall CSIR strategy, and to outline what risk management activities are necessary during the financial year. In addition, it aims to entrench a culture of risk management aligned with the CSIR's EPIC values. The development of the RMP for 2025/26 FY considers the CSIR Strategic and Annual Performance Plans. The RMP seek to identify, analyse, evaluate, monitor and report on key organisational risks, but importantly the development and implementation of risk-response/mitigation strategies to bring the associated risks to acceptable levels.

Risk management, as set out in King IV, addresses a much wider spectrum of risk than in the past. In addition, the corporate governance drivers behind risk management today require new ways of reporting and monitoring risk exposures. Therefore, it is important to note that the RMP is an evolving instrument. The contents of the plan reflect the current risk management requirements of the CSIR. The document is reviewed and updated annually by Exco, ARC and the CSIR Board.

When enterprise risk management (ERM) is applied to all aspects of the organisation, it assists the CSIR in making informed choices which:

- Provide assurance that current key/significant risks are known and effectively controlled;
- Improve business performance by assisting with enhancing decision-making and planning.
- Promote a more innovative, less risk-averse culture in which the taking of calculated risks in pursuit of opportunities to benefit the organisation is encouraged; and
- Provide a sound basis for integrated risk management and internal control as components of good corporate governance.

D.1.3 LEGISLATIVE CONTEXT

The RMP is developed in line with the prescripts of applicable legislation and as amended from time to time, including but not limited to:

- The Public Finance Management Act, 1999 (Act 1 of 1999);
- National Treasury Regulations issued in terms of the PFMA;
- The Scientific Research Council Act,1988 (Act 46 of 1988);
- Occupational Health and Safety Act, 1993 (Act 85 of 1993); and
- Labour Relations Act (LRA), 1995 (Act 66 of 1995).

The RMP also incorporates the requirements of the King IV report on good Corporate Governance, COSO framework on Integrated Risk Management, as well as ISO 31000 as best practice guidelines/framework on risk management. CSIR is in the process of implementing an ERM technology platform (system) to support the much-needed automation and to complement the existing ERM processes, standards and framework.

D.1.4 SCOPE OF APPLICATION

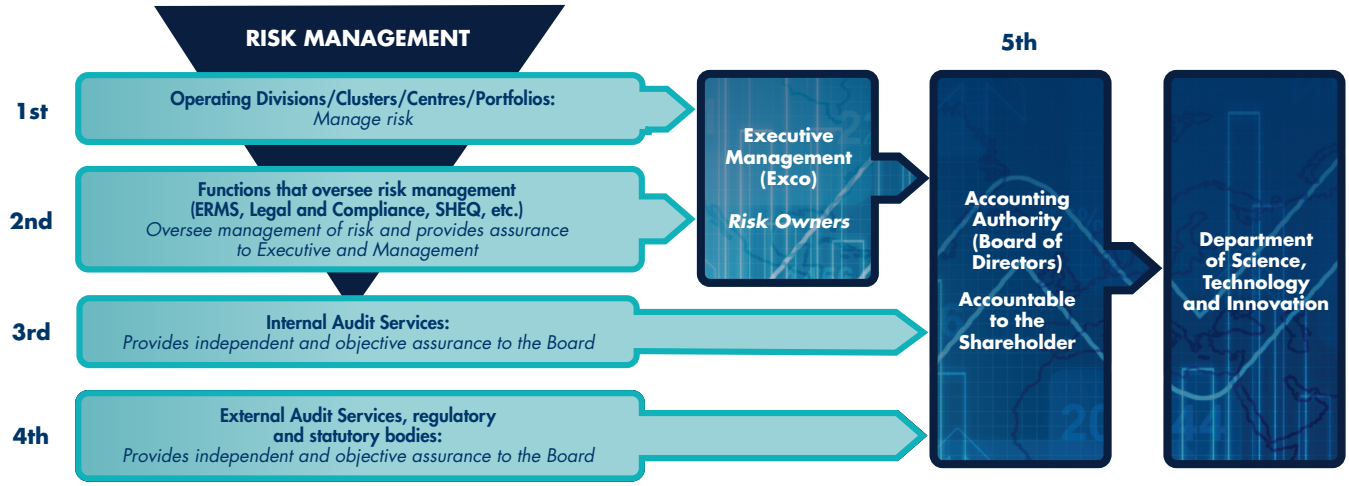
The RMP applies to all business activities of the CSIR.

D2 COMPONENTS OF THE RMP

The CSIR manages risk through a well-defined risk-governance model, commonly referred to as Five Lines of Assurance (defence) Model. Each component of this governance model is defined through several supplementary organisational structures, guidelines, templates and implementation tools that provide clarity and enhancement for stakeholder use and ensure a single approach to enterprise-wide risk management. The governance model comprises the elements outlined below.

D.2.1 RISK GOVERNANCE MODEL AND FRAMEWORK

The CSIR five lines of assurance model is outlined in the diagram below.



Ownership and management of risk lies with those who undertake the operations within the organisation (1st line assurance). Business operations are also responsible for implementing and maintaining effective internal controls, executing risk and control procedures, and implementing corrective actions to address process and control deficiencies. They identify, assess, and mitigate risks, guiding the development and implementation of internal controls, policies and procedures and ensuring that activities are consistent with goals and objectives.

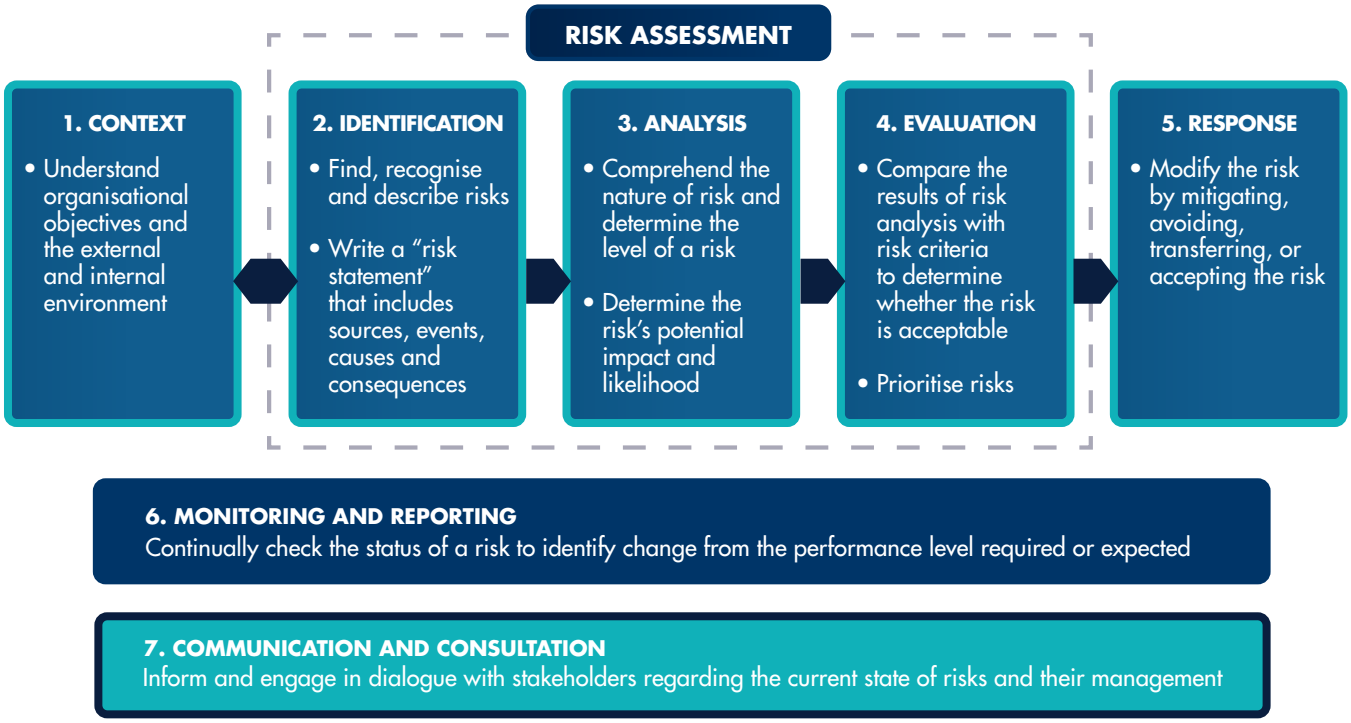
Functions that oversee risk management, (2nd line assurance) coordinate the management of risk in support of the risk owners (Exco) and line management, who in turn report to the BoD. The latter retains ultimate accountability for organisational risk governance. The Internal Audit function (3rd line assurance) provides independent assurance directly to the BoD on the adequacy and effectiveness of the internal control environment, risk management frameworks, systems, and implementation.

The five lines of assurance model recognises the external audit function as the fourth (4th) line of assurance, providing an independent and objective assurance to the BoD and the shareholder on the CSIR financial statements (statutory audit). The Auditor General of South Africa (AGSA) is the statutory body performing this function.

Robust oversight by the BoD and Exco (5th line assurance) establishes the cornerstone of effective risk management and sets the tone from the top. To give effect to their fiduciary responsibility, the BoD is supported by the ARC. The ARC is an oversight body delegated with the responsibility of implementing effective risk governance and strategy supported by an appropriate risk management framework that includes adequate control mechanisms to ensure effective risk management. The ARC also reviews the overall effectiveness of the risk management system, i.e. policy, framework, methodology, technology system, structures, response strategies, etc.

D.2.2 RISK MANAGEMENT FRAMEWORK OVERVIEW

The main elements of the CSIR's Risk Management Framework, as per the ISO 31000 standard, are reflected in the Risk Management Process depicted in the illustration below:



For clarity on the CSIR's approach, expanded descriptions of some steps of the process are given in the following sections.

Establishing the risk context

Establishing the risk context entails analysis of the CSIR's external and internal operating environment which is considered when managing risk as per the diagram below:

To achieve the CSIR's strategic objectives, a thorough analysis of the overall risk environment is conducted periodically to establish a common understanding of the risk universe that needs to be addressed. As this environment remains in flux, the relevant risk universe is continuously reviewed, updated, and agreed upon.

Risk analysis and evaluation to determine prioritisation

The outcomes of the risk identification and classification processes are compiled into multi-level and escalating risk and control registers across the organisation, with major risks reported to the next level, ultimately culminating in the formulation of the CSIR's top risks.

Risk registers are reviewed and updated on a quarterly (as well as ad-hoc) basis with the risk and control owners. After any strategic, policy, mandate or structural change, a risk assessment workshop is conducted to review and update the applicable risk register. Risks in CSIR have been classified into the following three broad categories:

- **Systemic risks -** originate from macro-economic and national challenges affecting the National System of Innovation and National Government Business Enterprise space in which the CSIR operates.
- **Strategic risks –** risks that directly impact on the ability of the CSIR to deliver on its strategic objectives and statutory mandate; and
- **Operational risks -** include financial, legal and compliance risks and are those risks affecting the systems, people, and processes through which the CSIR operates.

Risk mitigation

Risk mitigation entails implementing controls to manage the risk. These control options are:

- **Tolerate/accept –** accepting the risk by keeping activities unchanged. This option is applied when exposure is tolerable, control is impossible, or the cost of control exceeds potential benefit;
- **Treat/reduce –** adjusting (adding or revising) relevant activities;
- **Transfer –** sharing the risk by involving relevant stakeholders. This works well for financial risks, risks to assets and includes securing conventional insurance or sourcing a third party to manage or undertake the risk; and
- **Terminate/Avoid –** avoiding or cancelling the activities that give rise to the risk after considering the cost/benefit analysis.

Monitoring and Reporting

The CSIR's top risks are considered and updated quarterly to address risk movements, emerging risks and should be considered a living document. Furthermore, each risk is monitored by Enterprise Risk Management Services (ERMS) to verify the implementation of the proposed mitigation strategies and the impact on the internal control environment. ERMS also facilitates the review of the risks taking into consideration:

- Changes in the assessment of the risk;
- Changes to risks as forced by the macro environment;
- Suggested changes to the risk mitigation strategy;
- Progress made against the detailed action plans; and
- Any material factors from internal and external environment.

Internal audits and ad hoc risk assessments, either in accordance with the combined assurance plan or due to a perceived risk, will be conducted to monitor and evaluate the extent of compliance with policies, procedures, and proposed controls. The role of the Internal Audit function is to actively monitor the internal and external environment and, if identified risks are not responded to appropriately, to be the catalyst for ensuring that the risk universe is continually updated.

Furthermore, the CSIR will utilise the Risk, Audit and Compliance Committee (RACC) forum to establish a focused strategy for Risk Management, Compliance and Audit Steering Committee to steer and take responsibility for the CSIR RMP and to ensure the effective implementation thereof in support of combined assurance and ensuring that key risks are being managed appropriately. It will also implement a fit for purpose combined assurance operating model that will help the CSIR to effectively address its governance, risk management and compliance (GRC).

In alignment with King IV, the CSIR BoD will receive assurance regarding the effectiveness of the RMP through the following principles:

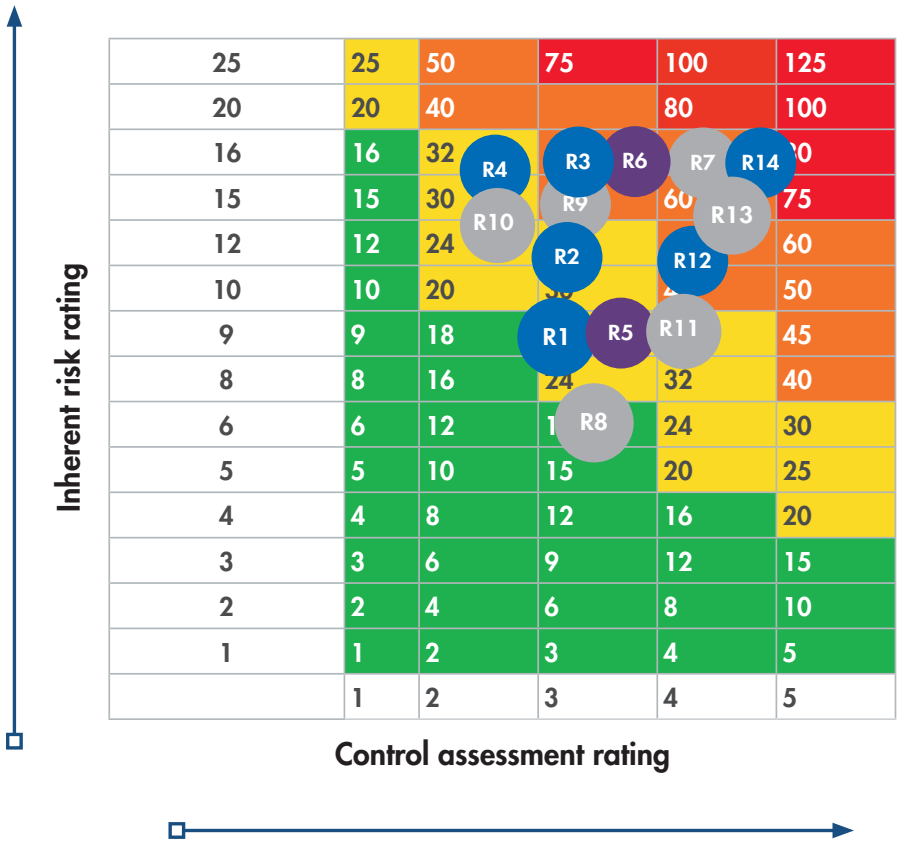
- On a quarterly basis, the RACC will provide Exco with progress updates against the combined assurance plan and progress against the implementation of the RMP;
- On a quarterly basis, management will provide assurance to Exco that the RMP is integrated into the daily activities of the CSIR. The CSIR CEO, as part of his quarterly report to the BoD, will provide assurance via the ARC on the status of the risk management system; and
- On an annual basis, the Internal Audit function will provide a written assessment of the effectiveness of the system of internal controls and risk management to the BoD via the ARC.

For the BoD to discharge their duty of ensuring effective and continual monitoring of risk management takes place, risk monitoring is an integral part of the CSIR RMP, to give assurance that measures remain effective.

D3 CSIR TOP RISK PROFILE

D.3.1 TOP RISK HEAT-MAP

The below risk heat-map identifies the top organisational risks that were identified through the risk identification, analysis and evaluation processes conducted by senior management (top-down) and through operational risk assessments conducted by all business areas (clusters, centres and portfolios). A strategic risk assessment process was conducted during the Exco strategy session in July 2024. The purpose of the process was to confirm the risks that Exco deems key to the achievement of the CSIR strategic objectives and goals, as well as to develop appropriate risk mitigation actions. The session was also used to identify emerging business risks as well as to evaluate the effectiveness of the current risk mitigation efforts/controls.



- Systemic risk
- Strategic risk
- Operational risk

1. Intergovernmental / public sector procurement constraints.
2. Financial unsustainability.
3. National scarcity of critical SET skills and expertise.
4. BCM 1- Unstable security of electricity supply/Loadshedding.
5. Inadequate scale and pace of IP commercialisation.
6. Inability to attract and retain SET skills and transformed employee profile.
7. BCM2 – Ageing and failing infrastructure.
8. Negative health, safety and environmental incidents.
9. Ineffective and inefficient business systems and processes.
10. Cybersecurity attacks.
11. Inadequate physical Security measures.
12. Inadequate security of national water supply.
13. Loss of mobile assets.
14. Declining PG funding.

D.3.2 CSIR RISK THEMES

The diagram below provides an overview of organisational risks that were identified, analysed, monitored and reported over the last five (5) financial years since the implementation of the new CSIR strategy in 2019/20 FY.

Residual risk rating	Low	Medium	High	Critical

RISK TITLE	RISK EXISTENCE SINCE THE IMPLEMENTATION OF CSIR STRATEGY IN FY 2019/20					
	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
1. Public sector procurement constrains	✔	✔	✔	✔	✔	✔
2. Financial unsustainability	✔	✔	✔	✔	✔	✔
3. National scarcity of critical SET skills and expertise	✔	✔	✔	X	✔	✔
4. Security of electricity supply	✔	X	X	✔	✔	✔
5. Inadequate scale of IP commercialisation	✔	✔	✔	✔	✔	✔
6. Inability to attract and retain key SET skills and transformed employee profile	✔	✔	✔	✔	✔	✔
7. Ageing and failing infrastructure	✔	✔	✔	✔	✔	✔
8. Negative health, safety and environmental incidents	✔	✔	✔	✔	✔	✔
9. Ineffective and inefficient business systems and processes	✔	✔	✔	✔	✔	✔
10. Cybersecurity attacks	✔	✔	✔	✔	✔	✔
11. Inadequate physical security measures	X	X	X	✔	✔	✔
12. Security of national water supply	X	X	X	X	✔	✔
13. Loss of mobile assets	X	X	X	✔	X	✔
14. Declining PG funding	X	X	✔	X	X	✔

The following key risks have since been adequately mitigated and removed from the top risk profile:

- Covid-19 disruption;
- Business disruption due to the CSIR re-organisation process and section 189 process;
- Inadequate marketing and brand positioning of the CSIR; and
- Inadequate/lack of a business continuity plan (BCP)

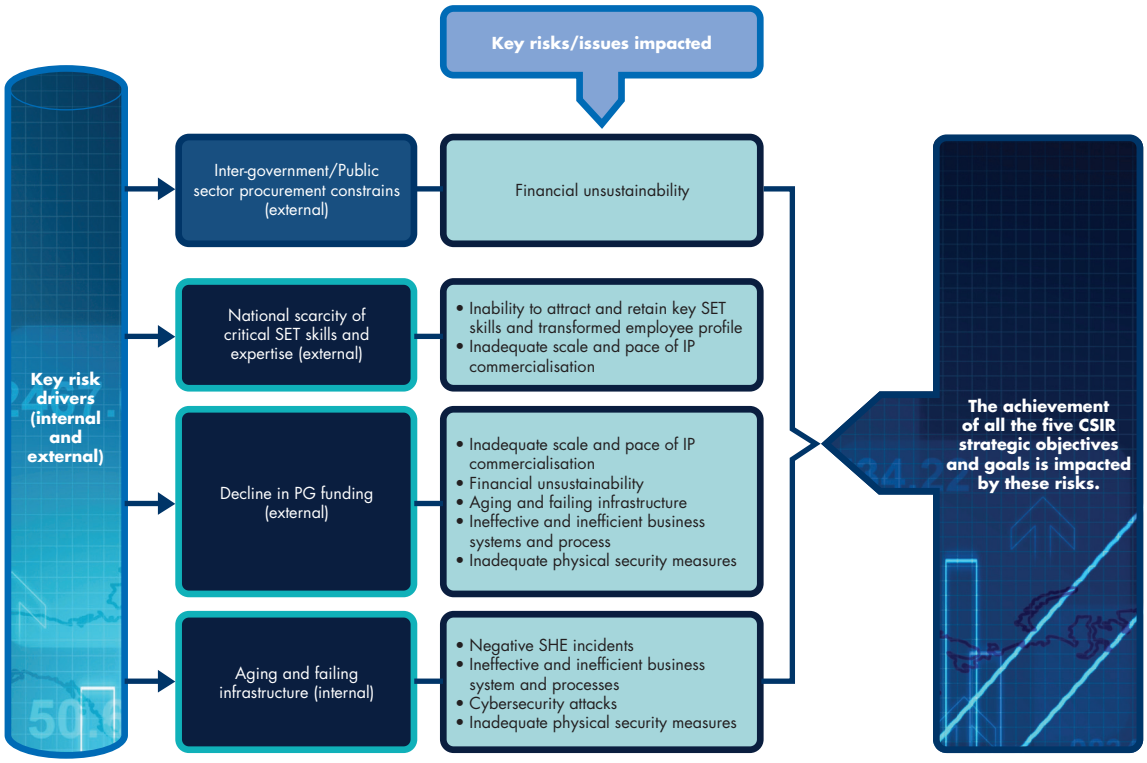
The CSIR is actively monitoring and proactively implementing appropriate internal control measures to mitigate against the following emerging risks:

- Irregular, fruitless and wasteful expenditure;
- Potential misuse/uncontrolled use of Artificial Intelligence (IA) tools in both RD&I and operational activities;
- Potential impact of Q3 the extorsion activities by criminals in public and private sector projects specifically on projects that involve the CSIR.
- Crisis at SA ports and potential impact on the CSIR business.

D.3.3 KEY RISK DRIVERS

A risk driver is anything that influences the nature of a risk. Risk drivers can be positive or negative, and internal or external. One risk driver can influence more than one risk, and/or multiple risk drivers can influence one risk. Examples of risk drivers are economic conditions, regulatory changes, technological advancements, human factors, operational processes, and environmental conditions. The speed and effective implementation of key risk mitigation actions on the risk drivers will drive the successful mitigation of other risks as depicted in the diagram below and therefore leading to the achievement of one or more strategic objectives and goals.

Below diagram provides an overview of top risk drivers and issues affecting CSIR's ability to effectively and efficiently mitigate its risks to acceptable level(s). Management is concerned about the pace/progress at which key remedial actions are being implemented to drive an overall effective risk mitigation process.



D.3.4 CONCLUSION

The CSIR proposes a proactive approach towards risk management and will continue to take the necessary measures to improve its ERM practices.

E

FRAUD PREVENTION PLAN

E1 INTRODUCTION

The CSIR's Fraud Prevention Plan (FPP) was developed in compliance with section 3.2.1 of the Treasury Regulations of the Public Finance Management Act (PFMA). The CSIR subscribes to the principles of good corporate governance, which require business to be conducted in an honest, ethical, and transparent manner. Consequently, the CSIR is committed to preventing and eradicating fraudulent behaviour at all levels within the organisation.

This FPP is premised on the CSIR Fraud Prevention and Management Policy ("FPMP") and the CSIR's core ethical values driving the business of the CSIR, the development of its systems, policies and procedures, interactions with upstream and downstream stakeholders in its value chain and overall value proposition, including public and private sector customers, members of the public at large, suppliers and service providers, employees, and its shareholder.

In alignment with the CSIR's core organisational EPIC values, this FPP is the cornerstone in promoting ethical conduct and determining how incidents or suspected incidents of fraud and corruption will be prevented, detected, and investigated.

The CSIR has zero tolerance and zero appetite for fraud and corruption. The organisation established a whistleblowing (i.e., protected disclosures) facility to support the efforts of this FPP. This facility is operated by an independent service provider on 24 hours, 7 days basis.

The Legal and Compliance portfolio, as part of their strategic business plan, working with the CSIR's Communications function, will continue providing extensive awareness and training on the CSIR's FPMP and the Ethics Statement and Code of Conduct to all CSIR employees and other stakeholders. This portfolio has also been creating awareness on the existence, purpose, and use of the whistle blower hotline. A comprehensive process of establishing a combined assurance model with other key role-players in the business to drive an adequate and effective Governance Risk Compliance ("GRC") management capability was developed and came into effect in FY 2024/25 as part of the broader CSIR governance controls. The Risk, Audit and Compliance Committee will also oversee the management of fraud and corruption matters within the CSIR and make recommendations on control corrections and improvements.

The FPP is a dynamic plan and will continuously evolve as the CSIR strives to continue promoting ethics and preventing fraud.

E.1.1 PURPOSE OF THE FPP

The purpose of the CSIR FPP is to establish an approach in dealing with fraud risk as mapped out in the Fraud and Corruption Risk Register, and it recognises the basic fraud prevention initiatives within the CSIR, as well as identifies the custodians responsible for the creation of awareness, enforcement and investigation of incidents or suspected incidents of fraud and corruption. The primary objectives of the CSIR FPP are to:

- Provide guidelines in creating awareness of, preventing, detecting, and reporting fraudulent activities within the CSIR;
- Create and encourage a culture within the CSIR where all stakeholders continuously behave ethically in their dealings with, or on behalf of the CSIR;
- Improve the application of applicable systems and compliance with applicable policies, procedures, and regulations;
- Encourage all employees and stakeholders to strive towards the prevention and detection of fraud impacting or with the potential to impact on the CSIR;
- Encourage all employees and stakeholders to report suspicions of fraudulent activity without fear of reprisals or recriminations; and
- Provide a governance framework within which the initiatives that support the creation of awareness, enforcement and investigation of incidents, or suspected incidents of fraud and corruption, are implemented and overseen.

E.1.2 LEGISLATIVE CONTEXT

The FPP was developed with the aim of giving effect to the requirements and stipulations of the following legislations, among others, as amended from time to time:

- The Constitution of the Republic of South Africa, 1996;
- The Public Finance Management Act, 1999 (Act 1 of 1999);
- Treasury Regulations issued in terms of the PFMA in April 2001;
- The Scientific Research Council Act;
- The Protected Disclosures Act, 2000 (Act 26 of 2000);
- The Prevention of Organised Crime Act, 1998 (Act 121 of 1998);
- The Prevention and Combatting of Corrupt Activities Act, 2004 (Act 12 of 2004); and
- All mandatory policies adopted by the Board of the CSIR contextualising legislative and related compliance requirements.

E.1.3 SCOPE OF APPLICATION

The FPP applies to all corruption, fraud, theft, financial misconduct and maladministration or suspected irregularities of such nature involving the following persons or entities:

- All members of the CSIR Board;
- All employees of the CSIR;
- Consultants, suppliers, contractors, collaborators, and sponsors and other providers of goods or services to the CSIR; and
- All parties representing the CSIR and its business activities in an official capacity.

E.1.4 POLICY STANCE

The policy of the CSIR is one of zero tolerance to fraud and corruption. All alleged cases of fraud and corruption will be investigated and followed up by applying all remedies available to the full extent of the law. These measures include existing financial and related controls, implementation of appropriate prevention and detection measures and verification mechanisms as prescribed in the systems, policies, and procedures of the CSIR.

The CSIR seeks and intends to facilitate a culture of voluntary disclosure of information relating to suspected fraud and related misconduct by employees in a responsible manner. Employees and stakeholders are encouraged to report suspicions of fraudulent activity without fear of reprisals or recriminations.

The efficient application of instructions and guidance contained in the regulations, policies and procedures of the CSIR is one of the most important duties of every employee in the execution of his/her daily tasks.

The policy stance is currently encapsulated in the FPMP and various CSIR policies and procedures, including, but not limited to, the CSIR Code, the CSIR Conditions of Service, CSIR Disciplinary Code and Procedure, CSIR ICT Policy, the Information Security Policy, Conduct of Research Policy and the CSIR Ethics Hotline Procedure.

To support and enforce this policy stance, the Compliance function within the Legal and Compliance portfolio encompasses specialist roles in Senior Compliance Specialist, Compliance Specialist, and Governance and Company Secretariat reporting to Manager: Compliance.

The Compliance function serves a management function primarily focused on devising, implementing, and overseeing organisational processes to meet its statutory and regulatory obligations. The Compliance function's objective is to integrate legal analysis, design and implement appropriate controls and form part of the Combined Assurance Plan of the organisation. Compliance services focus on educating the Board, senior management, and other employees, as well as preventing and rooting out misconduct, whether legal, ethical, criminal or otherwise. The Compliance function serves as the dedicated custodian of fraud prevention, fraud risk management and the process that is adopted by the CSIR in putting mechanisms in place to manage the CSIR's vulnerability to fraud. Such mechanisms are designed to prevent, deter, and detect fraud.

E2 COMPONENTS OF THE FPP

E.2.1 GUIDING PRINCIPLES

The FPP of the CSIR is based upon the CSIR's EPIC values of pursuit of "Excellence", being "People" centred, personification of "Integrity" and welcoming "Collaboration". The FPP places emphasis on Integrity. This principle is founded on honesty in business and other dealings, creating a culture of openness and disclosure, promoting the eradication of criminal, unethical and other irregular conduct and adopting a zero-tolerance approach towards fraud and corrupt activities. This FPP applies to all allegations, attempts and incidents of fraud that have an impact on or with the potential to impact the CSIR. All CSIR employees, management and other stakeholders must comply with the spirit and content of the FPP. A person who holds a position of authority as stipulated in section 34 of the Prevention and Combatting of Corrupt Activities Act, should report any suspected corrupt activity and/or an offence of theft/fraud to the police.

E.2.2 COMPONENTS

The CSIR's FPP encompasses controls that have three SOs:

- Prevent instances of fraud and corruption from occurring;
- Detect instances of fraud and corruption when they do occur; and
- Respond appropriately and take corrective action when fraud and corruption happen.

The FPP provides the CSIR with tools to manage fraud and corruption risk and has four phases:

- Assessment of organisational needs, based upon the nature of fraud and corruption risks identified in our Fraud Risk Register and existing control environment;
- Design of programmes and controls in a manner that is consistent with legal and regulatory requirements, as well as best practices;
- Implementation of programmes and controls through the assignment of roles, building of internal competencies, training, and deployment of resources; and
- Evaluation of programme and control design, implementation, and operational effectiveness.

Fraud prevention is a business imperative, and a shared responsibility between management and employees. The FPP forms part of the Shareholder's Compact that is approved by the CSIR Board annually. The components of the FPP are as follows:

- The CSIR's core organisational EPIC values;
- The Code;
- CSIR systems, policies, procedures, rules, and regulations;
- The CSIR Disciplinary Code and Procedure;
- Internal controls to prevent and detect fraud;
- Physical and information security management;
- Internal Audit function;
- Ongoing risk assessments;
- Reporting and monitoring of fraud allegations;
- Creation of fraud and corruption awareness among employees and relevant stakeholders through communication and education;

- Continued establishment and maintenance of a combined assurance committee to steer and take responsibility for the FPP and its effective implementation; and
- Ongoing review of the FPP.

The key deliverables of the FPP are to raise awareness about potential fraud and corruption, and to put fraud prevention and response strategies in place. In addition to the generic risks and mitigation strategies identified below, the CSIR has also developed and maintains a CSIR Fraud Risk Register as a sub-set of the overall organisational Risk Register. The Fraud Risk Register is a key outcome of the risk identification and assessment process and includes all key risks that require a mitigating response. The CSIR will be undertaking a review of the CSIR Fraud Risk Register in FY 2025/26 to ensure that it aligns to the risk trends which have been observed over time within the CSIR.

E3 APPROACH TO FRAUD PREVENTION

E.3.1 PREVENTING FRAUD

Fraud prevention strategies are the first line of defence and provide the most cost-effective method of controlling fraud within the CSIR. To be effective, fraud prevention requires a number of contributory elements, including an ethical organisational culture, a strong awareness of fraud among stakeholders and an effective internal control framework.

E.3.2 THE CODE

The Code establishes clear guidelines for contracted and non-contracted stakeholders of the CSIR regarding the standard of conduct required in their internal and external dealings for and on behalf of the CSIR. The generic risks identified by the CSIR in the application of the Code, are as follows:

- Lack of buy-in or compliance with the requirements of the Code by management and employees or official CSIR representatives;
- Lack of awareness and/or inadequate communication and training strategy relating to the Code;
- Employees with low integrity and/or standards of professional conduct seeking to enhance personal benefit; and
- Strict compliance with and acceptance of gifts and strong disclosure elements.

Strict compliance with the Code by employees and CSIR representatives, both in its spirit and content, addresses the aforementioned risks. However, recognising that striving to achieve such a status and culture of compliance in totality is idealistic, the CSIR will pursue the following tactics to improve the professional ethics and conduct of its employees and representatives:

- A hard copy and/or easy access to online soft copy of the Code will continue to be circulated to all employees and CSIR representatives, and will remain part of the induction packs for new employees/representatives;
- In line with international trends and practices, in October of each year the CSIR creates greater awareness of the principles in the Code as part of the Global Ethics Month;
- Relevant aspects of the Code will be included in awareness presentations, training sessions and communication programmes to create awareness thereof among employees and relevant stakeholders.

Further objectives of this training will include the following:

- Assisting stakeholders to understand the meaning of fraudulent and corrupt behaviour;
- Presenting case studies to assist employees in developing behaviour to articulate and encourage attitudes and values that support ethical behaviour in all conduct; and
- Communicating the implications of unethical behaviour and its impact for individuals, the workplace, professional relationships, the CSIR as a whole, external stakeholders and the public.

The Compliance function will continue with its responsibility for reviewing and revising the relevance and implementation of the Code, its communication and supportive education. This review and revision will also consider developments in international regulatory regime, thoughts, and generally accepted principles in ethics.

E.3.3 SYSTEMS, POLICIES, PROCEDURES, RULES AND REGULATIONS

The CSIR has a number of systems, policies, procedures, rules and regulations designed to ensure compliance with prevailing legislation and limit the risk of fraud. Fundamentally, all stakeholders should be fully conversant and compliant with these. In addition, several operational measures have been designed to control business activities. The generic risks identified by the CSIR, in terms of systems, policies, procedures, rules and regulations, are as follows:

- Lack of knowledge and understanding of prevailing policies and procedures among employees;
- Lack of structured awareness and training programmes for employees in applicable policies, procedures, rules and regulations;
- Non-adherence with policies and procedures, as a result of weaknesses in systems and tools;
- Lack of proper delegation and misinterpretation of the Approval Framework; and
- Non-compliance due to an absence of a culture of compliance and shared value system.

The aforementioned risks suggest that controls should be reviewed continuously to secure tolerable levels of compliance.

The CSIR recognises that its employees are often best placed to identify shortcomings or weaknesses in systems and procedures. Therefore, it is committed to harnessing this knowledge through the development of a structured programme aimed at encouraging employee commitment and effort in reporting such weaknesses. In addition, the CSIR continues to undertake the following actions to mitigate the risks identified:

- A training programme on the Code, finalised in FY 2024/25 will continue and be scaled up to guide the CSIR activities on fraud prevention and management into the future. The activities take the form of in-person training, online tuition, CSIR Intraweb snippets and posters, etc;
- Review of other CSIR policies that may be in conflict with the Code to bring them in harmony with the Code's core principles and prescribed procedures;
- Review of relevant CSIR policies to align them with the UN Global Compact and the UK Pact;
- Distribution of pocket-size and/or access to online copy, as the circumstances may demand, of quick reference booklet on the Code to employees;
- Internal audits and ad hoc risk assessments, either in accordance with a combined assurance plan or due to a perceived risk, will continue to be undertaken to monitor and evaluate the extent of compliance with policies and procedures. This exercise may also take the form of surprise audits in areas of the organisation identified as of high risk or strategic importance where an undetected incident of fraud could have seriously devastation effect;

- In instances where breaches occur, swift and appropriate disciplinary action will be undertaken to set an example to other potential wrongdoers;
- Staff and third-party or stakeholder (security) vetting. This exercise involves checks on employment references, criminal records, civil judgement records, disciplinary records, insolvency enquiries, connection with other businesses, validity of qualification and the like on prospective employees. To this end the CSIR is in the process of acquiring an electronic tool for the conduct of due diligence exercises on all stakeholders that it engages with. This will assist the CSIR in mitigating against the risk of reputational damage by association;
- A specific effort will be made to ensure that measures are put in place for the censure of suppliers and/or other providers of goods and/or services who are found guilty of unethical conduct or other irregularities. Any employee found to be colluding with suppliers will be subjected to immediate disciplinary action with a possible sanction of dismissal and/or personal liability for losses suffered.

E.3.4 DISCIPLINARY CODE AND PROCEDURE

The CSIR Disciplinary Code and Procedure prescribes appropriate steps to be taken to resolve disciplinary matters. The identified risks of fraud with regard to discipline and the application thereof are as follows:

- In some instances, the disciplinary process is too lengthy;
- Inadequate training of investigating officers presenting the case and parties chairing or adjudicating the charges;
- Inadequate maintenance and security of source documents to be used at disciplinary, criminal and civil proceedings; and
- Inconsistent application of rules, disciplinary actions and outcomes.

The CSIR recognises that the consistent, fair and efficient application of disciplinary measures is an integral component of making the FPP a success. The CSIR will continue to pursue the following steps to ensure the consistent, efficient and speedy application of disciplinary measures:

- With the HC department having reviewed and realigned the Disciplinary Code and Procedure with the principles of the Code by establishing specific offences emanating from the Code the Legal and Compliance portfolio, will continue with its training and awareness programme;
- Making sure all managers are aware of the content of the Disciplinary Code and Procedure, their responsibility for maintaining discipline, the standards of discipline expected of them, the procedure for the application of disciplinary measures and the disciplinary process through communication and awareness exercises;
- Ongoing training of managers and investigating officers with regard to the content of the Disciplinary Code and Procedures, the application of disciplinary measures and process, and sustaining this training in conjunction with the Compliance function and HC department;
- The development of a system to facilitate the consistent application of disciplinary measures, e.g., a monitoring system that includes proper record keeping of all disciplinary actions taken;
- The development of a system where managers are held accountable for the management and addressing of misconduct and fraud within their areas of oversight; and
- Implementation of a private and/or public recognition (as circumstances may demand) of those employees and other stakeholders who display conscientiousness by passing on information about fraudulent activities.

E.3.5 INTERNAL CONTROLS

This section of the FPP relates to basic internal controls to prevent and detect fraud. The systems, policies, procedures, rules and regulations of the CSIR prescribe various controls, which, if effectively implemented, will limit fraud within the CSIR. These controls may be categorised as follows, it being recognised that the categories contain overlapping elements:

- **Prevention controls:** These are divided into two sub-categories, namely;
  - Authorisation; and
  - Physical.
- **Detection controls:** These are divided into four categories, namely:
  - Arithmetic and accounting;
  - Physical;
  - Supervision; and
  - Management Information.

Prevention Controls

Authorisation:

All transactions require authorisation or approval by a responsible person with the appropriate authority limits. The authority limits are specified in the CSIR Approval Framework, the latter having been recently reviewed and approved by the Board.

Physical:

These controls are mainly concerned with the custody of assets and involve procedures and security measures designed to ensure that access to assets is limited to personnel who have been duly authorised, in writing. The CSIR Fixed and Movable Assets Policy governs the controls associated with the recognition, de-recognition, financing and transfer of assets.

Detection Controls

Arithmetic and accounting:

These are basic controls within the recording function that check that transactions to be recorded and processed have been authorised and that they are completely and correctly recorded and accurately processed. Such controls include checking the arithmetical accuracy of the records, the maintenance and checking of totals, reconciliation and accounting for documents.

Physical:

These controls relate to the security of records. Therefore, they underpin arithmetic and accounting controls. Their similarity to preventive controls lies in the fact that they are also designed to limit access to unauthorised persons.

Supervision:

This control relates to managers' supervision of day-to-day transactions and the recording thereof.

Management information:

This relates to the review of management accounts and budgetary control. These controls are normally exercised by management outside the day-to-day routine of the system.

Segregation of duties:

The lack of segregation of duties, or the overriding of existing internal controls, is a generic risk that exposes the CSIR to the inherent risk of fraud and manipulation of data. One of the primary means of control is the separation of those responsibilities or duties, which, if combined, enables one individual to record and process a complete transaction, thereby providing him/her with the opportunity to manipulate the transaction irregularly and commit fraud.

Segregation of duties reduces the risk of intentional manipulation or error and increases the element of verification. Functions that should be separated include those of recording, checking, authorisation, approval, custody, execution and, in the case of computer-based accounting systems, system controller functions and daily operations.

In the context of fraud, segregation of duties lies in separating either the authorisation or custodial function from the verification function, thus introducing and maintain the vital checks and balances in the performance of fraud-prone obligations. To ensure that these internal controls are applied effectively and consistently, deficiencies and non-compliance identified by internal audit will be addressed as follows:

- The CSIR will continue to regularly re-emphasise to all managers that consistent compliance by employees with internal control is in itself one of the fundamental controls in place to prevent fraud. Managers will be encouraged to recognise that internal control shortcomings identified during the course of audits are, in many instances, purely symptoms and that they should strive to identify and address the causes of these internal control weaknesses.
- The CSIR will ensure that the performance appraisal of senior managers will take into account the number of audit queries raised and the level of seriousness of the consequent risk to the CSIR, as a result of the internal control deficiency identified. This is intended to raise the level of accountability for internal control by the Accounting Officer and managers. Where managers do not comply with basic internal controls, e.g., non-adherence to the limits of the CSIR Approval Framework, firm disciplinary action will be considered.

E.3.6 PHYSICAL AND INFORMATION SECURITY

Physical security:

Recognising that effective physical security is one of the "front line" defences against fraud, the CSIR will take regular steps to improve it and access control at its sites of operation, to limit the risk of theft of assets. The CSIR will also conduct a regular review of the physical security arrangements at its offices and facilities and improve on weaknesses identified.

Information security:

The CSIR will ensure that employees are sensitised to the risks of fraud associated with poor management of information security on a regular basis to enhance their understanding thereof and the risks to the CSIR associated with poor control over confidential information. The CSIR's efforts, through its ICT function, include continuous information security breach tests, simulations, and awareness.

Regular reviews of information and computer security will also be considered. Weaknesses identified during these reviews will be addressed with the respective managers. The CSIR Information Security Policy expresses the CSIR's position and intent to implement, maintain and improve its information security measures.

E.3.7 DETECTING, REPORTING AND INVESTIGATING FRAUD

Detection controls are designed to discover any fraud or corruption as soon as possible after it has occurred. In spite of best practice prevention activities, fraud and corruption may occur. The next line of defence is a robust suite of detection strategies to discover any incident of fraud and corruption as soon as possible to minimise any detrimental impacts. The CSIR's detection controls include:

- Maintaining an effective system of internal controls;
- Review and approval of financial transactions;
- Review and approval of management reports;
- Internal and external audits;
- Monitoring and evaluation;
- Data analysis; and
- The CSIR Ethics Hotline Procedure to report allegations of fraud, corruption and unethical conduct.

E.3.8 RESPONSE

The CSIR's response strategies ensure that appropriate mechanisms are in place to:

- Take corrective actions;
- Minimise the impact of fraud and corruption risks;
- Improve prevention and detection strategies; and
- Report any occurrences to the relevant stakeholders.

All identified occurrences of fraud and corruption will be investigated in accordance with the principles enshrined in the Protected Disclosure Act, 2000 (Act 26 of 2000), the CSIR Ethics Hotline Procedure and this FPP. The principles include confidentiality, protection from victimisation and the application of justice. Key CSIR response strategies include:

- Investigation of all allegations of fraud and corruption;
- Central registry of all fraud and corruption allegations maintained, reported and monitored;
- • Disciplinary procedure;
- Review of internal controls post incident;
- Implementation of corrective and preventative actions and recommendations;
- Recovery of losses through appropriate legal mechanisms;
- Fidelity and employee dishonesty insurance; and
- Reporting of criminal behaviour to the relevant authorities for investigation and possible prosecution.

E.3.9 WHISTLE BLOWING AND PROTECTION OF WHISTLE BLOWERS AND THE FALSELY ACCUSED

Based on the Protected Disclosures Act, the CSIR commits itself to guarantee protection to whistle blowers and stakeholders against victimisation and is intended to encourage and enable stakeholders to raise serious concerns without fear of victimisation. To ensure that the protection measures are effective, the hotline is administered by an outside third-party organisation that undertakes strict confidentiality. It is also important for the organisation to get the right CSIR professionals trained in and who understand professional privilege and confidentiality in the conduct of investigations and consistently taking disciplinary action against those who breach this confidentiality and privilege. These professionals are the Compliance function within Legal and Compliance portfolio, and by virtue of their training and work appreciate legal the principles of confidentiality and legal privilege and the serious effects of a breach of these. Through education and screening reported cases to establish prima facie facts and evidence pointing to possible misconduct or breach of the Code and, where necessary, taking disciplinary action against the false accusers, the CSIR aims to limit incidents of abuse.

The protected disclosures set-up must also possess the ability to identify hoax calls or reports, and allegations that spring from personality clashes or possess political or racial undertones that do not by themselves seek to point to a suspected fraud and corruption incident. The identification of these is cardinal in ensuring the integrity of the hotline and to avoid wasting the organisation's resources.

E4 FURTHER IMPLEMENTATION AND MANTAINANCE

E.4.1 CREATING AWARENESS

This component of the plan comprises two approaches, namely education and communication. The strategic weaknesses identified in this area are as follows:

- Lack of a formalised strategy to create awareness among employees of the manifestations of fraud and the risks of fraud facing the CSIR; and
- Lack of knowledge of approaches to prevent and detect fraud in specific processes and transactions.

Key CSIR response strategies include:

Education:

The CSIR will ensure that regular presentations and formal training are carried out for employees to enhance their understanding of the manifestations of fraud prevention and detection techniques and the components of the FPP.

Communication:

Communication is crucial in creating awareness of the FPP among employees and other stakeholders. This is intended to facilitate a culture where all stakeholders strive to make the FPP a success and sustain a positive, ethical culture within the CSIR. This will increase the prospect of fraud being reported and improve the CSIR's prevention and detection ability.

The CSIR will consider various means of communicating its fraud prevention initiatives, some of which are already in implementation, including the following:

- Conducting workshops and creating awareness about the FPP;
- Developing a poster campaign aimed at all stakeholders to advertise the CSIR stance to fraud and its expectations with regard to the ethics and integrity of all stakeholders;
- Circulating appropriate sections of the Code to other stakeholders and integrating by reference, giving a web link to, the Code into all contracts, e.g., consultants and contractors;
- Publicising "lessons learned", following investigations into allegations of fraud among employees;
- Circulating successes related to the FPP and fraud modus operandi;
- Placing notices or other communiqués related to the FPP on notice boards and other areas to which employees and the public have access;
- Giving copies of the Code to suppliers of goods and services and seeking commitments from them, in writing, as a precondition to contracting with the CSIR;
- Developing promotional items communicating the FPP or components thereof; and
- Using the Intranet to communicate issues relating to the prevention and detection of fraud, including matters reported and action taken.

E.4.2 COMBINED ASSURANCE FORUM/COMMITTEE

The CSIR has established an operationally based combined assurance collaboration forum to steer and take responsibility for the FPP and ensure the effective implementation thereof, in support of combined assurance and ensuring that key fraud risks are being managed appropriately in the CSIR. The objectives of the combined assurance forum are mainly to:

- Identify and specify the sources of assurance over the CSIR's risks;
- Provide the Audit and Risk Committee (ARC), Human Resources, Social and Ethics Committee (HRSEC), Accounting Officer and Executive Management with a framework of the various assurance parties;
- Establish a combined assurance strategy and plan;
- Link risk management activities with assurance activities;
- Assist the Accounting Officer with reviewing the effectiveness of the risk management system; and
- Provide a basis for identifying any areas of potential assurance gaps.

The forum is responsible for the ongoing maintenance and review of the FPP, including:

- Evaluating reports of fraud and highlighting areas of risk within the CSIR;
- Considering fraud threats to the CSIR and addressing them;
- Monitoring action taken to implement recommendations relating to incidents of fraud;
- Steering and taking responsibility for the FPP;
- Reviewing and making appropriate amendments to the FPP;
- Continuous monitoring of the effectiveness of controls already in place and making improvements where necessary; and
- Ensuring that ongoing implementation strategies are developed and carried out.

E5 CONTROL ENVIRONMENT

The CSIR's ARC and HRSEC significantly influence the fraud control environment, particularly by setting the tone at the top. This is done in the discharge of its duties in terms of the PFMA and Treasury Regulations. The ARC and HRSEC systematically oversee, and periodically review the internal controls established by the management of CSIR. Oversight extends to:

- Enterprise risk and fraud risk management;
- The potential for management to override controls or exercise other inappropriate influence over the financial reporting process;
- Mechanisms for employees to report concerns;
- Receipt and review of periodic reports describing the nature, status and eventual resolution of alleged or suspected fraud;
- An internal audit plan that addresses fraud risk, and a mechanism to ensure that internal audit can express any concerns about management's commitment to appropriate internal controls, or to report suspicions or allegations of fraud;
- The involvement of other experts, such as legal and HR, as needed to investigate any alleged or suspected wrongdoing;
- The review of accounting principles, policies and reasonableness of significant estimates used by the CSIR;
- The review of significant non-routine transactions (if any) entered into by management and employees; and
- Functional reporting by internal and external auditors to the ARC.

E.5.1 INDEPENDENT ASSURANCE

The internal and external auditors will provide an independent assurance on the adequacy and effectiveness of CSIR's internal controls to prevent, detect and manage fraud and corruption. The independent risk assurers will, in addition to assisting the CSIR to benchmark the efficacy of its fraud management measures, also advise on the effectiveness of the CSIR's FPP

F

MATERIALITY FRAMEWORK

EXECUTIVE SUMMARY

In terms of Treasury Regulations for government departments, trading entities, constitutional institutions and public entities, issued in terms of the PFMA, 1999, the CSIR must have a materiality framework of acceptable levels of materiality and significance within the organisation.

The CSIR's reputation, built over more than half a century, depends on the nature of every business transaction, conducted by every employee, on a daily basis. It is built on an implicit set of values, which inspires our employees to maintain the highest ethical standards in all their dealings with our clients and stakeholders, as well as their relationships within the CSIR.

The CSIR is committed to a policy of fair dealing and integrity in conducting its business. This commitment is based on a fundamental belief in honest, fair and legal conduct in all business activities. We expect all our employees to share this commitment to high morals, ethics and legal standards.

Ethics involve the ability to distinguish right from wrong and a commitment to do what is right. Values are core beliefs that create individual attitudes. Although individual values may differ, this does not imply a choice about behaving ethically in the business environment of the CSIR. Our Code of Conduct, as well as the Constitution of the Republic of South Africa and the national laws and regulations, prescribe the legal conduct that embodies values based on ethical principles, while respecting cultural diversity.

F.1.1 TREASURY REGULATION 28.1.5

"For purposes of "material" [sections 50(1), 55(2) and 66(1) of the Act] and "significant" [section 54(2) of the Act], the Accounting Authority must develop and agree on a framework of acceptable levels of materiality and significance with the relevant Executive Authority in consultation with the external auditors."

(HOWEVER, THE CSIR HAS BEEN EXEMPTED FROM SECTION 54 (2) AND THIS SCHEDULE DOES NOT INCLUDE THIS SUBSECTION.)

	Material	
Section 50 (1)	(1) The Accounting Authority for a public entity must:	
	(a) exercise the duty of utmost care to ensure reasonable protection of the assets and records of the public entity;	Significant audit findings that could negatively impact on the CSIR's operations and the attainment of strategic goals.
	(b) act with fidelity, honesty, integrity and in the best interest of the public entity in managing the financial affairs of the public entity;	The CSIR sets high standards on fidelity, honesty and integrity. The best interest of the public entity is always relevant in fulfilling its mandate and in the execution of the Shareholder's Compact. Any acts of dishonesty, infidelity and others that are not in the best interests (from a research, financial and reputation perspective) of the CSIR are viewed in a serious manner
	(c) on request, disclose to the Executive Authority responsible for that public entity or the legislature to which the public entity is accountable, all material facts, including those reasonably discoverable, which in any way influence the decision or actions of the Executive Authority or that legislature; and	The CSIR is committed to disclosing any relevant information to its stakeholders. Materiality can only be determined if the nature of the information is known.
	d) seek within the sphere of influence of that Accounting Authority, to prevent any prejudice to the financial interests of the state	The CSIR employs an ongoing Enterprise Risk Management System, as well as controls that are aimed at the prevention/mitigation of any prejudice to the financial interest of the entity. Lack of the required governance processes, lack of due diligence in conducting business, and fruitless and wasteful expenditure are inherently regarded as material.
Section 55 (2)	(2) The annual report and financial statements referred to by PFMA Subsection 55 (1)(d) must:	
	(a) fairly present the state of affairs of the public entity, its business, its financial results, its performance against pre-determined objectives and its financial position as at the end of the financial year concerned	Significance/ materiality is calculated as 1% of revenue, which amounts to **R 32 072 210**.
	(b) include particulars of:	
	(i) any material losses through criminal conduct and any irregular expenditure and fruitless and wasteful expenditure that occurred during the financial year;	R1 000 000. All cases are unique and will thus be treated as such. These will be subject to internal audit reviews.

	Material	
Section 55 (2)	(ii) any criminal or disciplinary steps taken as a consequence of such losses or irregular expenditure or fruitless and wasteful expenditure;	R1 000 000. All cases are unique and will thus be treated as such. Issues that inform steps to be taken are: – The level of responsibility and position of the person involved; – The affected core business/support/ operational; and – The impact on other areas of operation of the CSIR. – These will be subject to internal audit reviews. – R1 000 000 (excluding losses incurred through normal operating activities) – Will disclose as prescribed.
	(c) include the financial statements of any Subsidiaries	All subsidiaries are consolidated.
Section 66 (1)	(1) An institution to which this Act applies may not borrow money or issue a guarantee, indemnity or security, or enter into any other transaction that binds or may bind that institution or the Revenue Fund to any future financial commitment, unless such borrowing, guarantee, indemnity, security or other transaction:	The CSIR complies with this requirement.
	(a) is authorised by this Act; and	
	(b) in the case of public entities, is also authorised by other legislation not in conflict with this Act; and	
	(c) in the case of loans by a province or a provincial government business enterprise under the ownership control of a provincial executive, is within the limits as set in terms of the Borrowing Powers of Provincial Governments Act, 1996 (Act No 48 of 1996).	

G

FINANCIAL PLAN

G1 CSIR BUDGET AND PARLIAMENTARY GRANT CASH FLOW 2025/26

G.1.1 CSIR STATEMENTS OF COMPREHENSIVE INCOME OVER THE MTEF PERIOD

Table G1: Statement of Comprehensive Income – MTEF Period

Statement of comprehensive income	Forecast 2024/2025 R'000	Budget 2025/2026 R'000	Estimate 2026/2027 R'000	Estimate 2027/2028 R'000
Total Operating Revenue	**3 120 526**	**3 207 221**	**3 298 923**	**3 356 248**
R&D Contract Income	**2 439 267**	**2 503 139**	**2 561 726**	**2 618 946**
Public – South Africa	1 709 553	1 760 267	1 780 068	1 800 177
Private – South Africa	258 228	260 961	274 009	287 709
International	357 001	354 851	376 142	394 949
Parliamentary Grant – Ringfenced	114 485	127 060	131 507	136 110
Parliamentary Grant	**679 721**	**702 070**	**735 084**	**735 084**
Royalty Income	**1 916**	**2 012**	**2 112**	**2 218**
Other Income	**(379)**	**–**	**–**	**–**
Total Expenditure	**3 245 214**	**3 299 884**	**3 355 331**	**3 402 179**
Employees' Remuneration	1 921 477	1 972 929	1 979 354	2 013 749
Operating Expenses	1 170 036	1 262 780	1 310 437	1 317 192
Depreciation	153 701	64 175	65 540	71 237
Profit/(Loss) before Investment Income	**(124 688)**	**(92 664)**	**(56 408)**	**(45 931)**
Net Finance Income	57 101	61 840	61 840	61 840
NET PROFIT/(LOSS)	**(67 587)**	**(30 824)**	**5 432**	**15 909**

G.1.2 CSIR STATEMENTS OF FINANCIAL POSITION OVER THE MTEF PERIOD

Table G2: Statement of Financial Position over the MTEF Period

Statement of financial position	Forecast March 2025 R'000	Revised Budget March 2026 R'000	Estimate March 2027 R'000	Estimate March 2028 R'000
ASSETS				
Non-Current assets	**813 441**	**849 757**	**860 337**	**872 832**
Property, plant, equipment and lease assets	808 791	845 107	855 687	868 182
Interest in Subsidiaries	4 650	4 650	4 650	4 650
Current Assets	**1 790 564**	**1 718 698**	**1 739 739**	**1 747 636**
Trade and other receivables	374 463	384 866	395 871	402 750
Inventory and contracts in progress	312 100	248 638	261 534	234 853
Cash and cash equivalents	1 104 001	1 085 194	1 082 334	1 110 033
TOTAL ASSETS	**2 604 003**	**2 568 455**	**2 600 076**	**2 620 468**
EQUITY AND LIABILITIES				
Reserves	**1 172 438**	**1 141 614**	**1 147 047**	**1 162 956**
Retained earnings	1 172 438	1 141 614	1 147 047	1 162 956
Non-current liabilities	**16 852**	**16 481**	**16 161**	**15 886**
Post retirement medical benefits and lease liabilities	16 852	16 481	16 161	15 886
Current Liabilities	**1 414 714**	**1 410 358**	**1 436 870**	**1 441 627**
Advances received	1 061 026	1 044 153	1 069 946	1 072 812
Trade and other payables	353 688	366 206	366 922	368 814
TOTAL EQUITY AND LIABILITIES	**2 604 003**	**2 568 455**	**2 600 076**	**2 620 468**

One needs to consider the budgeted current assets of R1.72 billion, cash balance of R1.1 billion in conjunction with the current liabilities of R1.41 billion. The current ratio (current assets/current liabilities) 1.22.

G.1.3 CSIR CASHFLOW STATEMENT

Table G3: CSIR Cashflow Statement

Cashflow statement	Forecast March 2024 R'000	Revised Budget March 2025 R'000	Estimate March 2026 R'000	Estimate March 2027 R'000
Cashflow from operating activities				
Cash receipts from external customers	2 442 244	2 541 335	2 565 731	2 643 832
Parliamentary Grant income	679 721	702 070	735 084	735 084
Cash paid to suppliers and employees	(3 238 331)	(3 223 192)	(3 289 075)	(3 329 050)
Cash generated from/(utilised in) operating activities	**(116 366)**	**20 214**	**11 740**	**49 867**
Net finance income	57 101	61 840	61 840	61 840
Net cash inflow/(outflow) from operating activities	**(59 265)**	**82 054**	**73 580**	**111 707**
Cashflow from investing activities				
Liquidation/(Purchase) of investments at fair value	_	-	-	-
Acquisition of property, plant and equipment	(154 264)	(100 491)	(76 120)	(83 732)
Net cash utilised in investing activities	**(154 264)**	**(100 491)**	**(76 120)**	**(83 732)**
Cashflow from financing activities				
Decrease in non-current liabilities	1 635	(371)	(320)	(275)
Net cash outflow from financing activities	**1 635**	**(371)**	**(320)**	**(275)**
Net increase in cash and cash equivalents	**(211 894)**	**(18 808)**	**(2 861)**	**27 699**
Cash and cash equivalents at beginning of the year	**1 315 895**	**1 104 001**	**1 085 194**	**1 082 334**
Cash and cash equivalents at end of the year	**1 104 001**	**1 085 194**	**1 082 334**	**1 110 033**

G.1.4 TWELVE MONTH CASH FLOW PROJECTION FOR PARLIAMENTARY GRANT: 2025/26 (INCLUDING VAT)

Table G4: Cash-Flow for Parliamentary Grant

R'000	Total	April	July	October	January
TOTAL 2025 MTEF ALLOCATION	1 326 696	237 154	237 154	237 154	615 233
Baseline	807 381	201 845	201 845	201 845	201 845
National Laser Centre	44 896	11 224	11 224	11 224	11 224
Laser Loan Programme	13 180	3 295	3 295	3 295	3 295
African Laser Centre	7 200	1 800	1 800	1 800	1 800
Implementation: Foundational Digital Capabilities and ICT RD&I Roadmap	75 960	18 990	18 990	18 990	18 990
Infrastructure Programme	72 966				72 966
National Integrated Cyber Infrastructure System	305 113				305 113

G.1.5 PPE BUDGET SUMMARY

Table G5: PPE Budget Summary

Category	2025/26 R'000
Scientific equipment	67.0
ICT equipment	77.9
Buildings	9.1
Air conditioners	4.2
Vehicles	3.6
Furniture and fixtures	2.9
TOTAL	**164.7**

The budgeted investment in property, plant and equipment for the 2025/26 financial year is R164.7 million, which includes fully funded grant assets of R64.2 million.

Notwithstanding the fact that an item is included in the property, plant and equipment budget, the investment remains subject to approval as per the Approval Framework of the CSIR and additional considerations such as strategic alignment, return on investment and available cash flow.

G.1.6 ALIGNMENT OF PARLIAMENTARY GRANT BUDGET AND STRATEGIC OBJECTIVES

Table G6: Link between Parliamentary Grant and CSIR Strategic Objectives

PG Allocation Description	Strategic Objectives	2025/26 Indicative Allocation (excl VAT) R'000	2025/26 Indicative Allocation (incl VAT) R'000
Total Baseline Allocation		**702 070**	**807 381**
Baseline Allocation to clusters	SO1,SO2 & SO3	**319 021**	**366 875**
Portfolios and Support Functions		**248 600**	**285 890**
Leadership Team	SOS	40 980	47 127
Supply Chain Management	SOS	7 130	8 200
Campus Master Plan Office	SOS	5 000	5 750
Internal Audit	SOS	10 808	12 429
Research and Development Office	SO1,SO2 & SO3	9 983	11 480
Planning and Reporting	SO1,SO2 & SO3	14 S04	16 679
Information and Knowledge Management	SO1,SO2 & SO3	21 456	24 67S
BEI Operations	SO1,SO2 & SO3	6 004	6 904
CSIR Board and sub committees	SOS	3 328	3 827
Legal Services	SOS	21 339	24 540
Compliance	SOS	5 946	6 838
Knowledge Commons	SOS	3 923	4 511
FMSS – Embedded Engineering support	SOS	3 802	4 372
Information and Communication Technology	SOS	41 107	47 273
Human Capital	SO4 & SOS	32 11S	36 933
Strategic Communication and Stakeholder Relations	SOS	21 176	24 3S2
Capability Development Programmes (Previously: Strategic Programmes) – Thematic		**100 978**	**116 125**
Research Centres	SO1,SO2 & SO3	45 000	51 750
New Capability Development Initiatives (Thematic Programme)	SO1,SO2 & SO3	16 370	18 826
RDI Infrastructure	SO1,SO2 & SO3	0	0
Human Capital Skills Development	SO4	39 608	45 549
Young Researcher Establishment Fund (YREF)	SO4	0	0
Commercialisation and Technology Transfer (Thematic)		50 000	57 500
Commercialisation Seed Fund	SO1,SO2 & SO3	0	0
Technology Demonstrator Fund	SO1,SO2 & SO3	0	0
Technology Commercialisation (APEX)	SO1,SO2 & SO3	0	0
Commercialisation Capacity Investment	SO1,SO2 & SO3	7 000	8 050

PG Allocation Description	Strategic Objectives	2025/26 Indicative Allocation (excl VAT) R'000	2025/26 Indicative Allocation (incl VAT) R'000
Governance Structures and CSIR Committees		2 000	2 300
CSIR Board and sub committees	SO5	1 200	1 380
Research Ethics Committee	SO5	600	690
PG Investment Committee and Industry Panel	SO5	200	230
Discretionary Allocations (To be invested upon receipt of motivations)		24 471	28 142
Strategic Initiatives	SO5	24 471	28 142
Ring-Fenced Allocations		**451 578**	**519 315**
Laser Loan Programme	SO2 & SO3	11 461	13 180
National Laser Centre	SO2 & SO3	39 040	44 896
African Laser Centre	SO2 & SO3	6 261	7 200
WEF Affiliate Centre	SO2 & SO3	0	0
Implementation: ICT R&D Strategy	SO2 & SO3	66 052	75 960
Infrastructure Programme	SO2 & SO3	63 449	72 966
National Cyber Infrastructure System (NICIS)	SO2 & SO3	**265 316**	305 113
TOTAL		**1 153 849**	**1 326 696**

G.1.7 MEDIUM TERM EXPENDITURE FRAMEWORK ALLOCATION TO THE CSIR (EXCL VAT)

Table G7: Medium Term Expenditure Framework allocation to the CSIR (excl VAT)

Category	2023/24 R'000	2024/25 R'000	2025/26 R'000	2026/27 R'000
Baseline Parliamentary Grant	**714 308**	**679 721**	**702 070**	**735 108**
Parliamentary Grant	714 308	679 721	702 070	735 108
Ring fenced allocation	**386 233**	**422 545**	**451 578**	**481 246**
Laser Loan Programme	10 498	10 970	11 461	11 986
National Laser Centre	35 760	37 366	39 040	40 829
African Laser Centre	5 735	5 992	6 261	6 548
WEF Affiliate Centre	5 179	–	–	-
Implementation: Foundational Digital Capabilities and ICT RDI Roadmap	73 245	62 381	66 052	63 453
Infrastructure Programme	–	59 917	63 449	66 356
National Integrated Cyber Infrastructure System (NICIS)	255 816	245 920	265 316	292 075
TOTAL	**1 100 541**	**1 102 266**	**1 153 649**	**1 216 354**

G2 5-YEAR AUTHORITY TO ISSUE GUARANTEE INSTRUMENTS

Table G8: CSIR Five-year authority to issue guarantee instruments

Financial year ending	Total annual limit R million
31 March 2025 #	110.24
31 March 2026 #	690.14
31 March 2027 #	699.04
31 March 2028 @	700.00
31 March 2029 @	700.00

This is an approved amount @ This is a planned amount

The CSIR has obtained National Treasury approval to issue guarantee instruments not exceeding the above set limits. This approval is set to expire on 31 March 2027. The approval was granted under the following conditions:

- CSIR to submit quarterly reports to National Treasury on utilisation of the annual limit;
- CSIR's liquid assets may not fall below R1.47 billion while the approval is in effect; and
- CSIR is to report disputes and/or contraventions related to contracts for which an authorised guarantee is attached.

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