



National ICT R&D and Innovation Strategy



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The purpose of the Information and Communication Technology (ICT) Research and Development (R&D) and Innovation Strategy for South Africa is to create an enabling framework for the advancement of ICT R&D and innovation, in a systematic fashion, within the context of the National R&D Strategy. It sets the agenda and framework for maximising the contribution of R&D and innovation in science and technology in South Africa. It provides a coherent, systematic approach to R&D that will contribute to improved quality of life and enhanced economic competitiveness. It also identifies a number of technology and innovation domains as critical for South Africa, each of which has unique characteristics that require specific strategies. The ICT R&D and Innovation Strategy is specifically for the ICT domain. Its vision for ICT in 2015 follows:

South-Africa is an inclusive information society where ICT-based innovation flourishes. Entrepreneurs from historically disadvantaged population groups, rural communities and the knowledge-intensive industry benefit and contribute to the well-being and quality of life of our citizens. South Africa has a strong national ICT brand that captures the vibrancy of an industry and research community striving for excellence, characterised by innovative approaches to local and global challenges, and recognised for its contribution to the economic growth and well-being of our people and the region.

In line with this vision, the following outcomes are intended:

- Achieving global leadership in identified key scientific and technological domains;
- Developing multi-disciplinary technologies, skills and methodologies to address areas of market neglect, especially to eradicate the digital divide;
- An indigenous ICT sector that is developed, growing, innovative and competitive; and
- The smart proliferation of ICT within other sectors of the economy.

To implement the vision, the ICT R&D and Innovation Strategy builds on existing strengths and opportunities and addresses current weaknesses in the system in order to improve significantly the quality of life as well as creating wealth for the people of South Africa, especially the historically disadvantaged. The Strategy was developed and will be implemented in the context of the new governance framework for R&D. It will support early-stage R&D in generic technologies with application across a broad range of sectors (Type 1 R&D) and more mature technology with a strong sectoral focus (Type 2 R&D).

The strategy will be implemented through a coherent, integrated and well-administered system of partnerships, financing, processes, policies and infrastructure. Underpinning the strategy are three **strategic objectives** and four **supporting objectives**:

STRATEGIC OBJECTIVES

1. **Focused world-class research** - focus and strengthen research activities at higher education institutions (HEIs) and R&D institutions to create recognised world-class research competencies in the country.
2. **Strong and robust innovation chain** which results in increased ICT patenting, improvements in digital divide indicators and a vibrant hi-tech ICT Small Medium and Micro Enterprise (SMME) industry.
3. **Advanced human resource capacity** - achieve a marked increase in the advanced ICT skills base to improve the absorptive capacity in ICT and thereby enable focused research and innovation.



SUPPORTING OBJECTIVES

1. **Effective research infrastructure** – establish powerful research infrastructure supporting focused research and local and international collaboration.
2. **Vibrant international cooperation** – create strong R&D links with countries which are the leading players in world ICT R&D to accelerate the achievement of objectives 1 to 3.
3. **ICT policy, institutional and other support** – implement effective policy and other support structures at the DST, its agencies and HEIs in support of the strategy.
4. **Resourcing the ICT R&D and innovation system** through funding that places South Africa on a trajectory where ICT GDP Expenditure on R&D (GERD) will start approaching OECD levels (0.4% of GDP) by 2015. As at 2004/2005, South Africa's Gross ICT expenditure on R&D (GERD) was 0.11% of GDP.

Achieving these objectives will support the creation of a strong South African ICT brand that reflects key focal points of the strategy: the generation of knowledge and the needs of the developing world as differentiators for South-Africa. The strategy will be implemented through a number of interventions listed below, and progress will be monitored based on a number of key performance indicators (KPIs):

INTERVENTIONS

1. **Advanced human capital development programme** - dramatically improve the post-graduate enrolment and completion rate in ICT by supporting young researchers as students in employment.

2. **Critical mass research programme** - support focus and critical mass R&D in identified technology and application domains through an array of instruments that link established researchers and draw in new researchers. These include postdoctoral researchers and international experts available in the National System of Innovation (NSI). Support would go towards core grant proposals, funding, research chairs, networks and centres of excellence.
3. **International ICT R&D collaboration programme** that supports the objectives of the strategy through collaborative R&D projects, researcher mobility and science and technology networking.
4. **Large innovation initiatives and grand challenges** – address the innovation chasm by stimulating broad collaboration across disciplines and among players in various stages of the innovation pipeline through appropriate alignment with and leveraging of the Innovation Fund and other instruments.
5. **ICT R&D in industry programme** – Address current low levels of investment in ICT R&D and the low uptake by industry and other sectors of society of research results from academic and other research institutions. This will be done through awareness raising and advocacy, incentives, industry research collaboration support, for example, in the Technology and Human Resources for Industry Programme (THRIP), and people mobility. Efforts will go towards building on the ICT R&D roadmap programme and increasing collaboration at the intergovernmental and parastatal levels.
6. **ICT R&D and society programme** – contribute to the realisation of the benefits of ICT R&D for improved quality of life and in support of an inclusive information society through a multidisciplinary information society research programme, market neglect innovation and a young scientist and engineer programme.



- 7. R&D infrastructure programme** - enabling simulation, experimentation, collaboration and other research processes, implemented through a number of specific infrastructures, by supporting research groups through equipment grants as required.
- 8. Futures research, future technologies and strategy implementation and renewal support** - support renewal of ICT R&D and enable effective planning of ICT aspects of the NSI through ICT futures research and research in future and emerging technologies, and by providing effective support for implementation of the strategy.
- 9. Funding the ICT R&D and Innovation Strategy** – support implementation of the ICT R&D strategy through increased funding levels to facilitate investment levels in line with national R&D strategy goals (R&D of 1% of GDP by 2008 and 1.5% by 2012).

The KPIs for the strategy provide a basis for measuring key aspects of the strategy implementation:

- **Human Resource Development Indicators** – will ultimately be measured through PhD graduation rate and ICT Full-Time Equivalent (FTE) researchers with PhDs. Due to the lag that can be expected in these indicators, these measures will be supplemented by short-term indicators such as the enrolment at Bachelor, Honours, Masters and PhD levels as early indications of the effects of the ICT R&D and Innovation Strategy;
- **Research Performance Indicators** – will be measured by the country's share in global ICT publications and the Relative Citation Index for ICT publications attributable to South-Africa; and
- **Innovation performance** – will be measured through US/EU/SA ICT patent share and business expenditure on ICT R&D and Innovation (ICT BERD).

The strategy will be implemented by existing players including universities, the Meraka Institute, science councils, business incubators, science/technology parks, industry and government. Together, these entities will work towards the objectives of the strategy. The strategy will be executed in the context of new and existing initiatives that complement the ICT R&D and Innovation Strategy such as initiatives of the Department of Communications to harness implementation of the ICT BEE Charter, various initiatives and instruments of the Department of Trade and Industry, JIPSA and planned interventions addressing mid-level skills supporting the industrialisation of the R&D and innovation outputs resulting from the implementation of the strategy. The Department of Science and Technology (DST) is responsible for oversight and coordination of the implementation of the strategy. The DST will establish a monitoring framework, key performance indicators, measures, benchmarks, controls and models. It will also support and engage with provinces and assist them with their initiatives in line with the national plan. The DST is also in the process of establishing formal mechanisms of cooperation with key departments and agencies that will ensure coordinated implementation of the strategy.

The timeline for implementation of the strategy is illustrated in Figure 1.

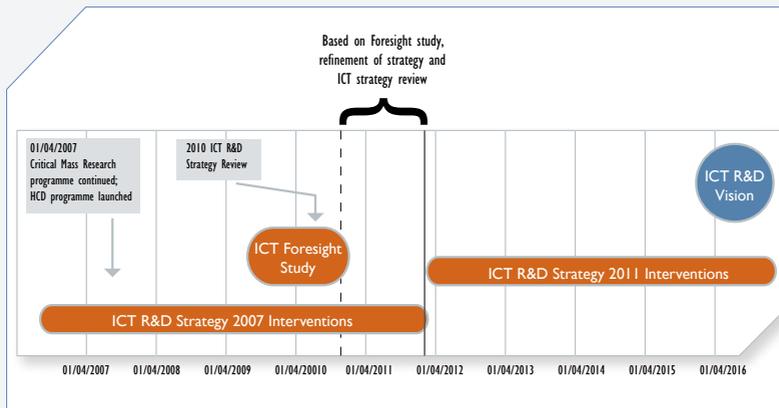


Figure 1: ICT R&D and Innovation Strategy Timeline



The strategy and the implementation thereof will be reviewed after three or four years by a panel that includes international experts. The results of this input, together with the results of the ICT foresight study, will feed into a revision of the strategy which could include new interventions or changes to the interventions initiated in the first five years. This process will be repeated after another five years. Technology and application domains that will be supported by the strategy include:

- mobile, wireless and satellite technologies;
- computational science and high-performance computing;
- geomatics and spatial technologies;
- human language technology;
- open-source software;
- software engineering and software architecture;
- information security;
- human-computer interaction;
- ICT in education and health;
- ICT for disability;
- e-government; and
- ICT in manufacturing

Implementation of the strategy is expected to yield a number of socio-economic benefits including:

- Improved quality of life for all South Africans, an inclusive democracy, good governance and social stability through the application of ICT to address basic needs. This in turn will contribute to poverty eradication and the achievement of social development goals.
- A highly competitive economy based on the comprehensive integration of ICT into all aspects of society and the economy, including smart infrastructure and effective service delivery as envisaged in the Advanced Manufacturing Technology Strategy.
- An exponential improvement in the knowledge and skills levels of South Africans brought about by effective utilisation of the benefits of ICT and the information society at all levels, from basic literacy to advanced technical qualifications.

- A vibrant, sustainable and innovative indigenous ICT industry with a strong export focus, contributing significantly to reducing the ICT balance of payment which:
 - Addresses a significant portion of South-Africa's ICT needs through an indigenous component of the ICT industry;
 - Includes a thriving technology-based SMME sector;
 - Supports the emergence of South African ICT multinational corporations; and
 - Attracts investments by overseas-based multinational corporations in R&D, innovation and manufacturing facilities and resources in South Africa.

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