# Research innovation at the University of Pretoria

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**The University of Pretoria is nationally and internationally recognised for the excellence of its research outputs. Its ambitions and activities are influenced by more than 100 years of learning, scholarship, research and public engagement.**

Over the past 20 years, the University has produced, on average, the highest percentage (14%) of the total South African research output, and has more than 300 National Research Foundation (NRF)-rated researchers among its academic staff – more than 12% of South Africa's NRF-rated researchers. Its consistent performance in research production and postgraduate output is further reflected in the number of journal articles that are listed in the International Scientific Index (ISI) and the International Bibliography of the Social Sciences (IBSS).

Contract research (often referred to as externally funded research), constitutes an important source of research revenue for the University. It is essentially research that is funded by external sources, including government, foreign funders and industry or commerce.

Typically, these sources of funding include government funding instruments, such as the Technology and Human Resources for Industry Programme (THRIP), the Innovation Fund and the Biotechnology Regional Innovation Centres (BRICs). Industry sources include large corporations, and small and medium enterprises (SMEs), while foreign funders include the European Union Framework programmes, as well as foundations, agencies and collaborative research funds.

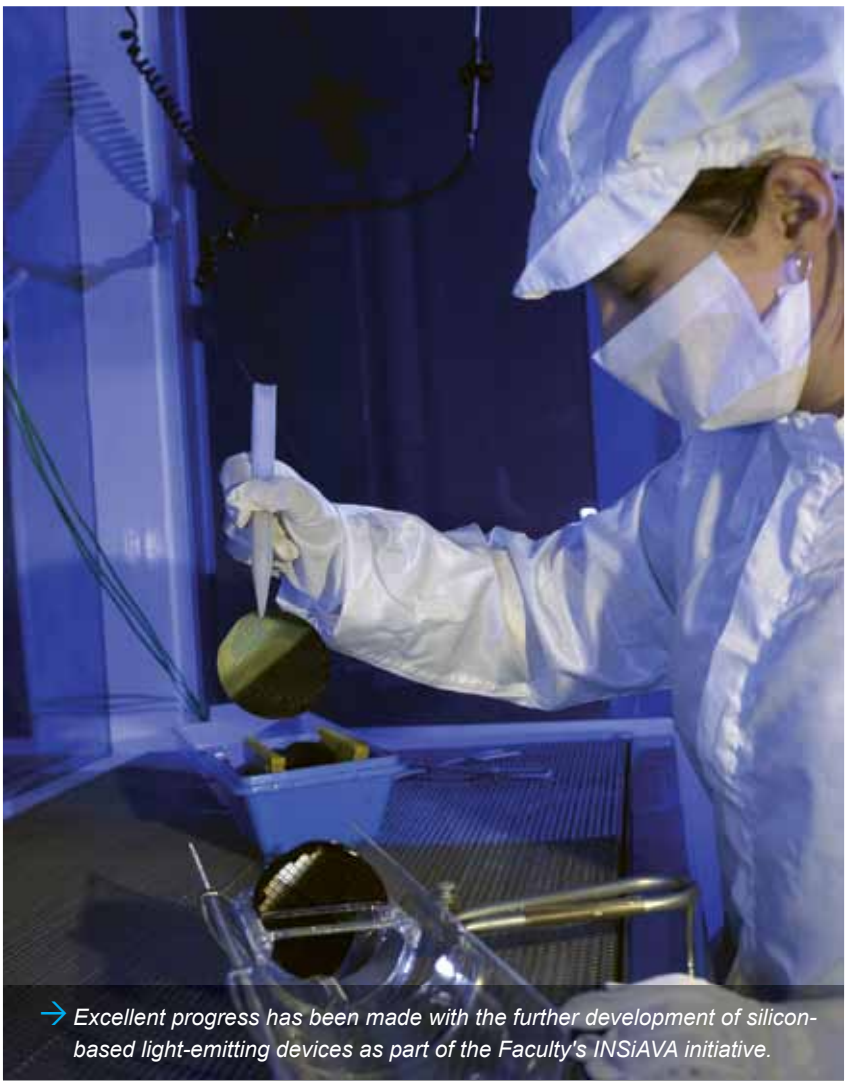
## Addressing the need for new knowledge and human capacity

The University's strategic goal over the next 15 years is to raise its international profile by increasingly addressing society's need for new knowledge and human capacity through research.

The provision of human capital will be founded on its research intensity by increasing the output of graduates with higher degrees in both research and professional fields, and replenishing the University's own human capital. The emphasis will be on accelerating knowledge generation by fostering collaboration with government, higher education institutions and the private sector to generate the hybrid spin-offs needed for development. At the same time, key international partners and knowledge networks will be sustained and further developed to strengthen the University's research capacity and linkages.

Areas of existing research strengths will be used as catalysts to develop a pervasive research culture, and cross-cutting research themes of national, regional and/or international relevance will be identified to leverage research capacity and impact. Optimal synergies will also be sought between research and teaching excellence to inform inquiry-led curricula at undergraduate and postgraduate levels, and between research and professional programmes and qualifications to strengthen the identity of the University.

Thus, in addition to equipping its graduates with the attributes necessary for adapting to the demands of the fast-changing world of work, the University will enhance social and economic development by being a university committed to the needs and challenges of its context, and by contributing to the high-level human capital required to address some of the major challenges of our times. As a research-intensive institution, the implications are that it will concentrate on problems of national and/or regional concern in order to maximise local impact, while enhancing its academic stature and visibility within a highly competitive international world.



*Excellent progress has been made with the further development of silicon-based light-emitting devices as part of the Faculty's INSiAVA initiative.*

Increasing its international profile, through a focus on unique local opportunities and collaborative research, is a primary objective of the University of Pretoria. By strengthening activities in the areas of immediate national need and ensuring that those fields that ultimately affect human welfare are developed, the University will be able to make a significant contribution in overcoming South Africa's challenges and developing human capital in the country.

In general, this means that the University must develop international profiles in areas of importance to developing nations, especially those in Africa. Engineering is one of the broad fields that have been identified. Areas in which capacity should be developed to contribute to addressing some of the major challenges of the developing world include efficient water use in arid regions, mitigating the impact of climate change, promoting sustainable rural development, sanitation, providing sustainable sources of energy, transport, municipal management, and managing health systems and hospitals.

## Innovation support

The University's research objectives are supported by its Department of Research and Innovation Support (DRIS), which plays an integral role in the practical implementation of the University's research agenda. It provides a range of support services that are aimed at promoting research development and innovation, as well as the protection of intellectual property and the conclusion of licensing agreements to commercialise technologies developed by the University's employees and students.

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The University's Contracts and Innovation Support Office within DRIS supports researchers by creating an enabling environment for research, and obtaining funding for research from third parties. It also coordinates processes, systems and structures to facilitate innovation at the University of Pretoria. This includes developing the capacity needed to access market opportunities, and to define and implement routes to market for technological innovations. Furthermore, it develops and coordinates mechanisms to enable the University to take advantage of national innovation funding instruments. It supports researchers in the management of large innovation projects, and provides budgeting guidelines and financial administration support where needed. Finally, it builds strategic networks with other higher education institutions, government agencies and industry partners, as well as strategic international partners.

## Innovation and technology transfer

The main goal of technology transfer (the transfer of technology developed by University researchers to the private sector) is to improve national economic growth through greater technological innovation. Technology transfer contributes directly to technological innovation by supplying the private sector with new technologies that have commercial potential. While businesses look forward to the prospect of receiving new products and services, universities are motivated by the potential income stream from successful licensing agreements, and greater employment opportunities that graduates may have with industry partners.

The legislative environment includes the Technology Innovation Agency Act, Act No. 26 of 2008, and the Intellectual Property Rights from Publicly Financed Research and Development Act, Act No. 51 of 2008. These acts of Parliament provide South African universities with new intellectual property management protocols.

The University's Technology Transfer Office (TTO) facilitates the transfer of discoveries created using the University resources (physical and human) into new products and services for the public good and benefit. It promotes regional economic growth and job creation, rewards, retains and recruits suitable staff, and builds relationships between faculties and the University's research and innovation community. It also creates, fosters and develops (new) relationships with industry. Furthermore, the TTO generates net royalty income for the inventors and the University, facilitates and generates new funding support for the University and/or faculty from sponsored research funding, consulting opportunities, and donations of money or equipment, and acts as a service centre to the University, faculties, staff and students in all areas related to the protection of intellectual property.

Research and innovation activities often go hand in hand, which is why it is essential for the University to invest in the innovation value chain. Once a scientist declares that he or she has an invention to disclose, the staff of the TTO will determine whether the intellectual property is patentable. "For an invention to be patentable, it should be novel, useful in the field and not obvious," explains Refilwe Ngoato, Technology Transfer Manager.

The first step is to determine that the invention is in fact new. A number of patent analytical tools are used for this purpose, such as that of Thomson Reuters. After this has been established, a patent attorney that is best skilled in that particular field assists with the filing of the patent.

For the filing of a patent, there are two options. A scientist can either file a South African provisional patent, which provides the research team with a further 12 months to conduct additional research and development, or a Patent Cooperation Treaty (PCT) could be filed, which is an international patent. "Normally new technologies need to be developed further," says Ngoato. In the case of an invention with a high commercial potential, Ngoato advises filing a PCT application, as this provides up to 18 months to do further research and development, conduct market analysis and investigate commercialisation options.

Once a patent has been filed, scientists can proceed with publishing the findings of their research and presenting their research at conferences and symposiums.

According to Prof Stephanie Burton, Vice-Principal: Research and Postgraduate Education, the University of Pretoria, as a research-intensive university, places great emphasis on the impact of research outputs, the publication of research articles in accredited journals, citations and the international recognition of research findings. In South Africa, higher education institutions receive subsidy points from the Department of Higher Education and Training on the basis of their research outputs. This includes publications in journals, books and conference proceedings.

However, to ensure the protection of intellectual property, it is important for scientists to at least obtain a provisional patent before publishing their research. "If one is developing a process or product that will save the world, it is important to take the long-term approach, and appreciate the advantage of sacrificing short-term benefits for long-term gains," she concludes.