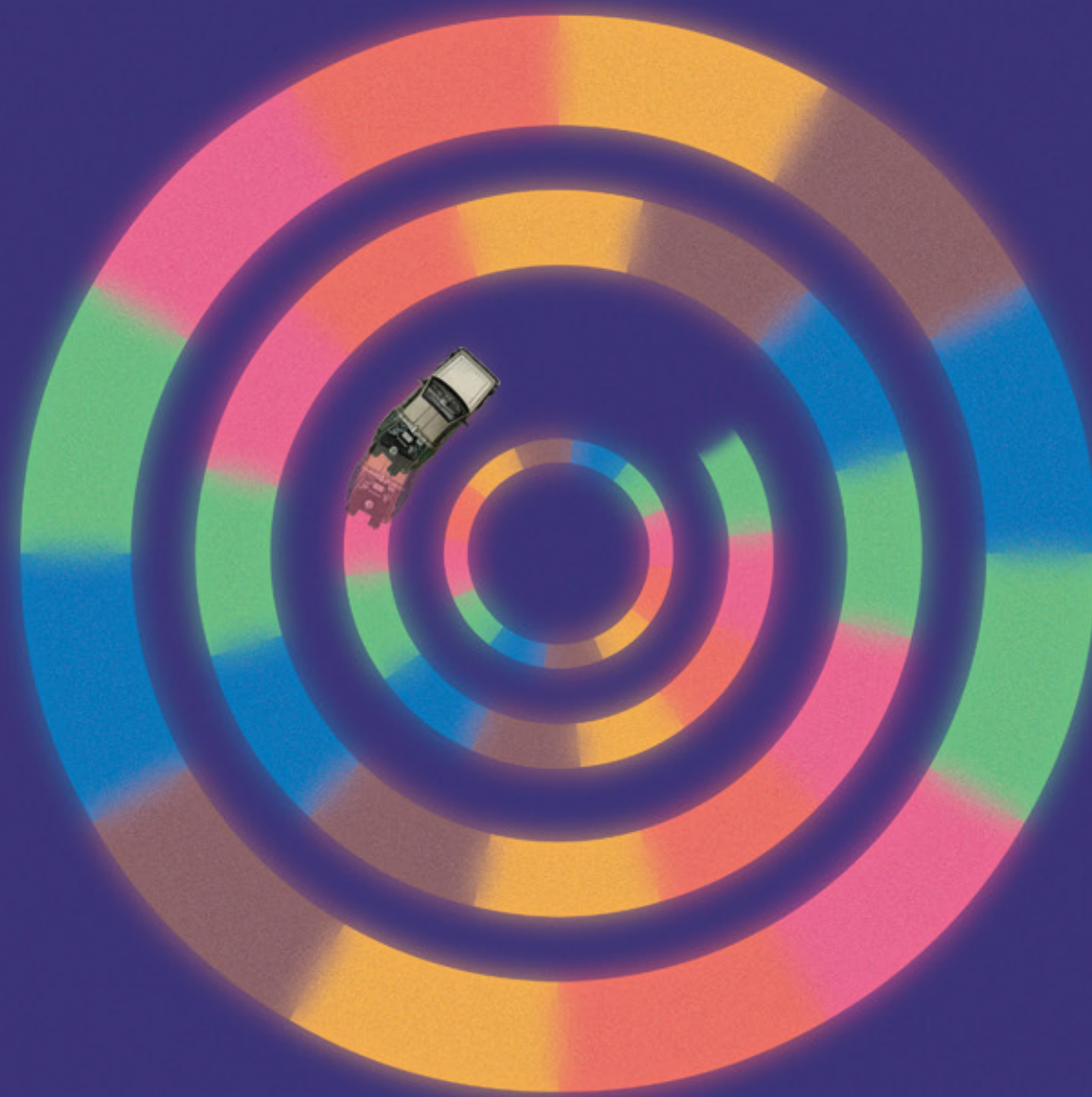
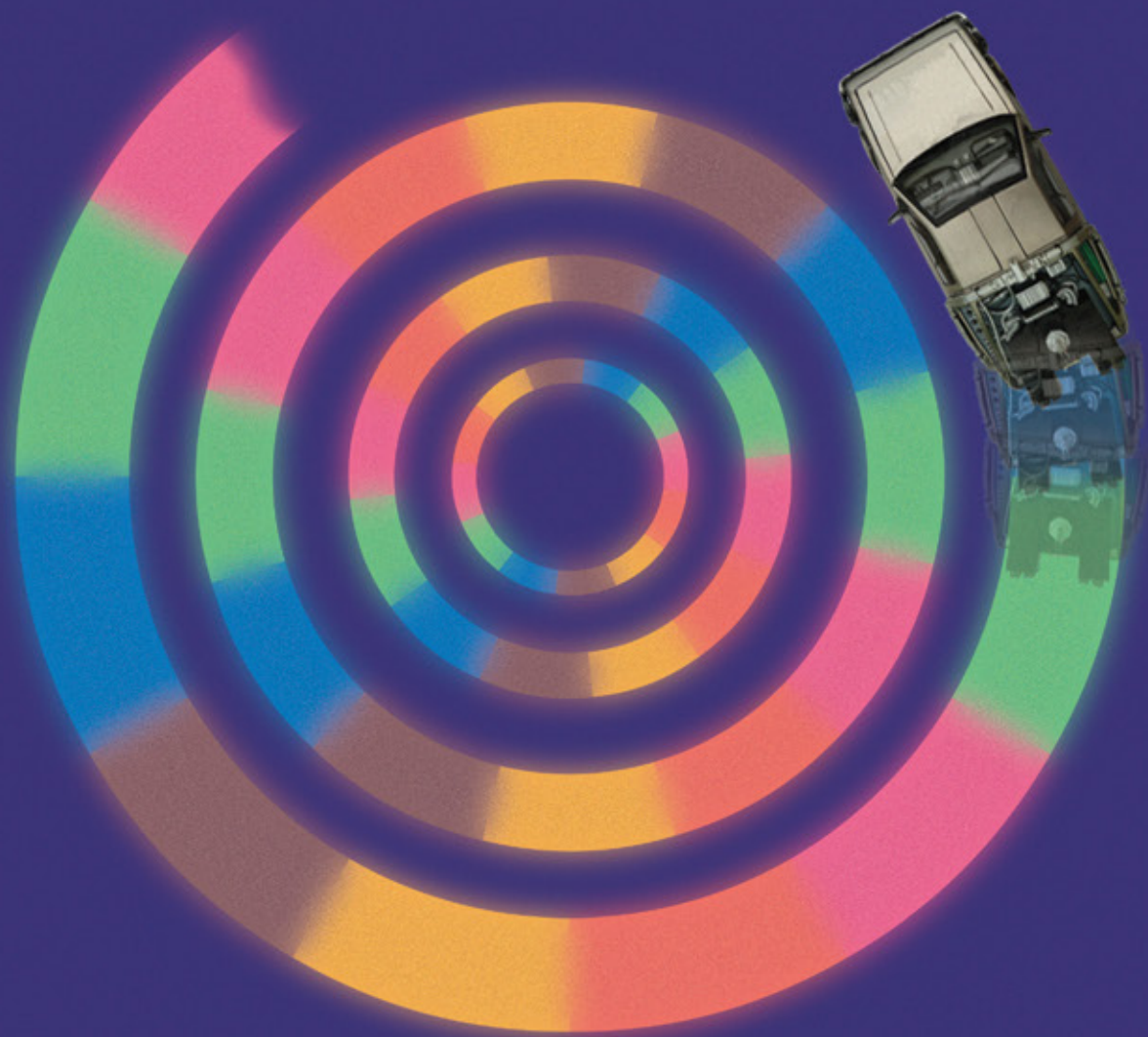




Innovation at UCT 2015



Research Contracts & IP Services
2 Rhodes Avenue
Mowbray
7701

Email innovation@uct.ac.za
Phone 021 650 4015
Twitter @UCT_RCIPS
Web www.rcips.uct.ac.za

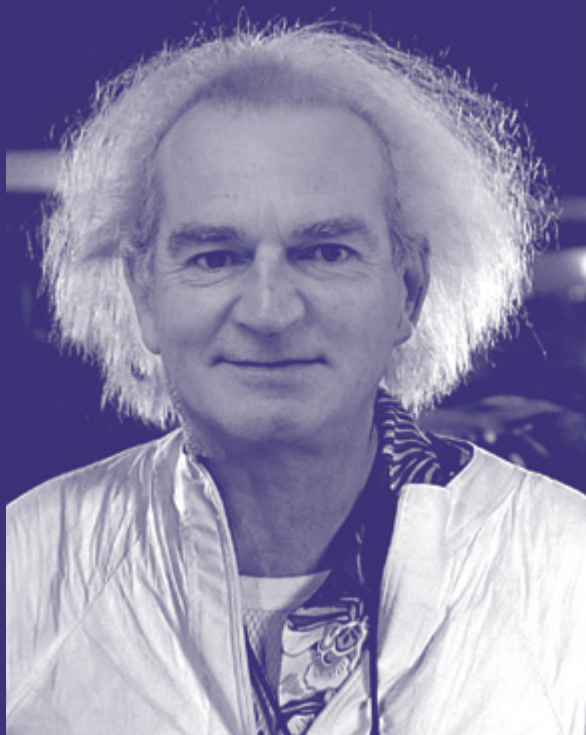


This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.



Back to
the Future

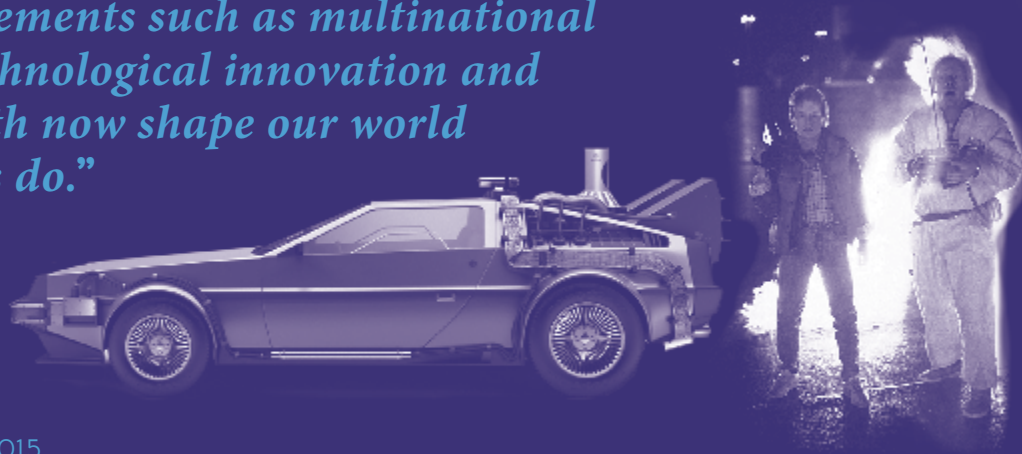
Message from the Director



In the 1989 sequel to 'Back to the Future', the protagonist Marty McFly travels to the future to the year 2015. He encounters a world with flat-screen TVs, video conferencing, smart glasses, hoverboards and the use of biometrics to secure transactions. The future is here and it's brighter than the movie could have foreseen. This publication will share

with you the wonderful innovations happening at UCT. Through the look and feel of this publication, we also hope to elicit some nostalgia from the 1980s, in the spirit of 'Back to the future'.

The late 1980's were indeed a very important period in world history. Time¹ describes 1989 as *"...1989 truly was one of those years that the world shifted on its pivot. Some things did change, and changed utterly; we are living with their consequences still. Some things ended, too — not just communism as a state practice, for example, but also the idea that the international system is driven solely by state action. In a way that was only dimly perceived 20 years ago, elements such as multinational business, technological innovation and personal faith now shape our world just as states do."*



On the technology front in the 80s, we saw the release of the first Apple Macintosh (1984). Microsoft's first retail version of its operating system was released (1985) and was followed in 1989 by the first edition of the now standard Office suite. In the same year, Nintendo debuted one of its landmark products, the Game Boy. However, the most profound invention of the late 1980s was probably Tim Berners-Lee's, the creation that would become the internet. Locally we saw the unbanning of the ANC, the release of political prisoners and other events that preceded the release of Nelson Mandela in early 1990.

UCT also began patenting some proprietary technologies in the 80s. Our first patent was in 1984 (Pulverizing method and Apparatus). Another two came along in 1987 (Axial Flow Pump and Measurement of Speed) and one in 1989 (Shock Absorbing Material).

Today, UCT is one of the leading research universities on the continent. With over forty invention disclosures per year and a patent portfolio containing inventions with exceptional potential and numerous licenses and companies. In the words of Ronald Reagan² - *"Never has there been a more exciting time to be alive, a time of rousing wonder and heroic achievement."*

Here at UCT, we feel we are still in the most exciting time to be alive and hope to share our vision of the future with you.

¹Shifting On Its Pivot, By Michael Elliott Thursday, June 18, 2009

²1986, State of the Union Address

2014 in perspective

On various fronts, 2014 was the most successful year to date in terms of IP management and commercialisation. We had the largest number of spin-off companies in a year (3), the highest number of invention disclosures being received by RCIPS (41), the largest annual IP commercialisation revenue (R6.4m) and the largest number of national phase patent applications filed (58).

There has been a significant increase in the level of funding coming into UCT to support innovation within the university. TIA Seed Funding contributed over R4m coming into the university for early-stage projects and R 102m for Strategic Health Innovation Partnerships (SHIP), launched by the South African Medical Research Council to address product development for critical health areas.

“Café Scientifique” events continued their success in 2014 with four events being held at the Irma Stern Museum. These are an international initiative where academics engage with the community in an informal environment to inform them about their current work over a glass of wine. The primary objective from RCIPS’s perspective is to highlight technologies that are close to commercialization and that may require Angel Investor funding. The aim is also to attract alumni to become involved in mentoring start-up companies. Three events were sponsored by the Technology Innovation Agency and RCIPS was pleased to secure a new sponsor for the 2015 events – IP firm Spoor & Fisher.



*Dirk Hanekom (Spoor & Fisher)
& DVC Prof Danie Visser*

Using the funding received from the National IP Management Office (NIPMO), various posts were filled and recruited for including a Business Development Manager, a Project Manager and a Marketing Intern. The funds have also been used for strategic projects within RCIPS.

RCIPS launched a new publication “Innovation Opportunities” which will profile

technologies in the UCT portfolio that are available for licensing, entrepreneurship opportunities, UCT products from incubated ventures and also investment opportunities in our spin-off companies. A limited print run of Innovation Opportunities will be produced, using the Innovation Bridge funding. An online e-version will be maintained and updated regularly by the NIPMO-funded Marketing Intern. The opportunities will also be available as downloadable individual PDFs.

Innovation Awards

The achievements of technologies at a number of competitions and innovation showcases have again underlined the quality and relevance of innovations coming from UCT. This reinforces and emphasizes the need to increase the support for commercialisation to ensure that our technologies find application in the market.

Lumkani Fire Detector



A technology that has received considerable recognition is the Lumkani fire detector, designed for use in homes in informal settlements to alert residents to fires. Lumkani, which means “be alert” measures the rate of temperature rise to trigger an alarm in the device – preventing false alarms in a typically smoky environment. Importantly it triggers alarms in neighbouring houses for an area of up to 60m, mobilising the community to respond to the fire.

The project was the brainchild Senior Lecturer Samuel Ginsberg of the Department of Electrical Engineering, and was developed as Francois Petousis’s Electrical Engineering student project.

Of particular note, Lumkani won the Western Cape Premier’s Entrepreneurship Recognition Awards as the best student start-up (November 2014) and won the Comfortable Home Category in the Better Living Challenge 2014 (December 2014), which was run as part of the Cape Town Design Capital 2014 programme.

UCT’s TIA Seed Fund support has enabled a large-scale pilot of over 1000 devices to be rolled out in Khayelitsha. During December 2014 the device showed its worth, preventing the spread of two fires. In the one instance, neighbours were able to extinguish a fire in a house whose owner was away at work. The team has grown and a company is being formed to commercialise the technology and provide the infrastructure to network and monitor the devices.

The accolades received include:

- Global Social Venture Competition – final held in San Francisco - People’s Choice Award and came in the top six globally (May 2014)
- Winner South African leg of the SeedStars World competition in Cape Town
- Three awards at the SA Innovation Summit in Cape Town: second prize in the Pitching Den competition; second prize the Inventor’s Garage; and a trip to Japan with an SA trade delegation to an innovation summit in Osaka (September 2014)
- Grand Prize prize at LaunchLab’s Pitching Den (Stellenbosch) as the best start-up featured (September 2014)
- Won the Tech-I start-up competition for the Global Innovation through Science & Technology (GIST) held in Marrakech, Morocco as part of the Global Entrepreneurship Summit (November 2014)
- Nominated by a Shuttleworth Foundation fellow for a Flash Grant of \$5,000 and won this award and recognition



Dr George Vicatos and his MSc student Severin Tenim won the Popular Mechanics Inventor of the Year award in the “Cutting Edge” category for their mechanical prosthetic hand. The artificial hand is low cost and provides greater functionality than alternatives in the category.



For the third year in a row a UCT’s entry has won the NSTF-BHP Billiton Awards 2014 for “an Individual or a Team for an Outstanding Contribution to SETI through Research leading to Innovation: in a Corporate organization or Institution”. This year’s winner is “Elemental”, a Computational Fluid Dynamics software, developed by Prof Arnaud Malan (Mechanical Engineering) that provides unprecedented insight during product design. The software has already been used in the design of aircraft for Airbus, but has also enhanced the industrial fan offerings of local firm, CFW Fans (Pty) Ltd.



A UCT invention, “Hand Exoskeleton” was placed in the top five pitches at the recent international Googlefest Zurich pitching competition. In fact, three of the top five positions were taken by The Swiss SA Business Development Programme entrepreneurs. This project was showcased by Gavin Jones who aptly branded the device “reScribe™”. Gavin, a TIA-CHUMA intern spent time at RCIPS during his training. reScribe is a low cost stroke rehabilitation device which was developed by Yasheen Brijlal, a UCT student from the Department of Electrical Engineering, Dr Lester John and Dr Sudesh Siravasu (both Department of Human Biology).

2014 RCIPS Dashboard

Research

2113

Research Contracts Signed

2013: 1719

R 1,18b

Research Contract Value

2013: R 978 m

R 1,23b

Total Research Income

2013: R 957 m

R 684m

Value Foreign Research Contracts Signed

2013: R 644 m

R 496m

Value Local Research Contracts Signed

2013: R 334 m

1549,12

Publications (2013 figure)

2012: 1390.89

IP Protection

41

Invention Disclosures

2013: 38

88

Patent Applications Filed

2013: 25

16

Patents Granted

2013: 31

Innovation

19

License Agreements (Outbound)

2013: 29

R 1,32m

License Income

2013: R 1,76m

39

Materials Transfer Agreements (Outbound)

2013: 7

R 16,52m

Estimated Value of Equity in Spin-Offs

2013: R 1,76 m

3

Spin Out Companies

2013: 1

R 6,38m

Total Income from IP

2013: R 1,89 m

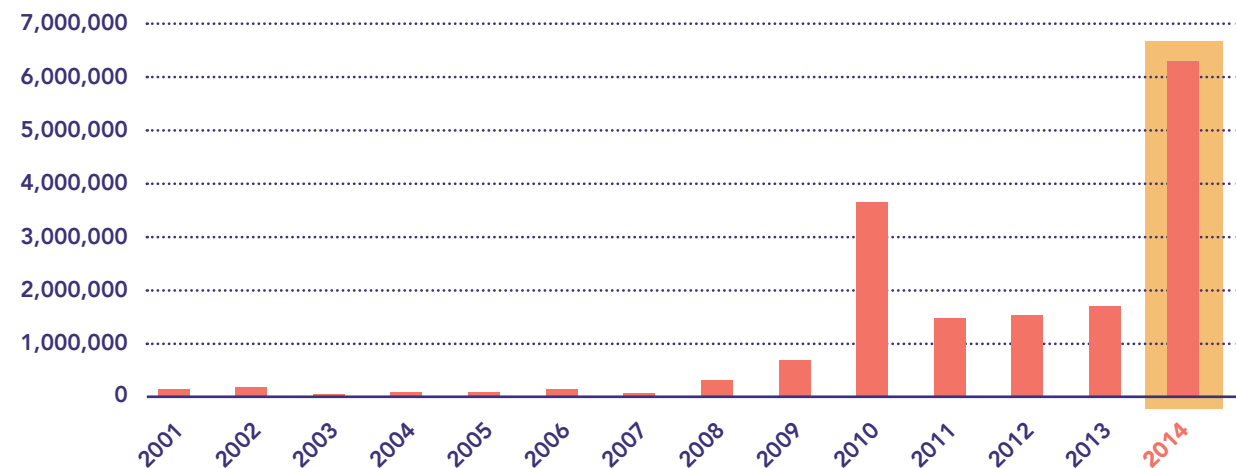
Annual UCT Patent Portfolio Statistics

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012* | 2013 | 2014‡ |
|--|------|------|------|------|------|-------|------|-------|
| Disclosures | 9 | 31 | 25 | 31 | 36 | 36 | 38 | 41 |
| Total Patent Applications Filed – all stages | 50 | 64 | 46 | 57 | 68 | 56 | 25 | 88 |
| National Phase Patents Granted (incl. European validation) | 3 | 10 | 47 | 36 | 29 | 26 | 31 | 16 |
| Provisional | 5 | 27 | 9 | 15 | 14 | 13 | 14 | 12 |
| PCT | 3 | 3 | 20 | 8 | 9 | 8 | 8 | 8 |
| National (including Divisionals, excluding Regional) | 36 | 28 | 10 | 29 | 38 | 31 | 3 | 58 |
| Regional | 6 | 6 | 6 | 5 | 7 | 4 | 0 | 7 |

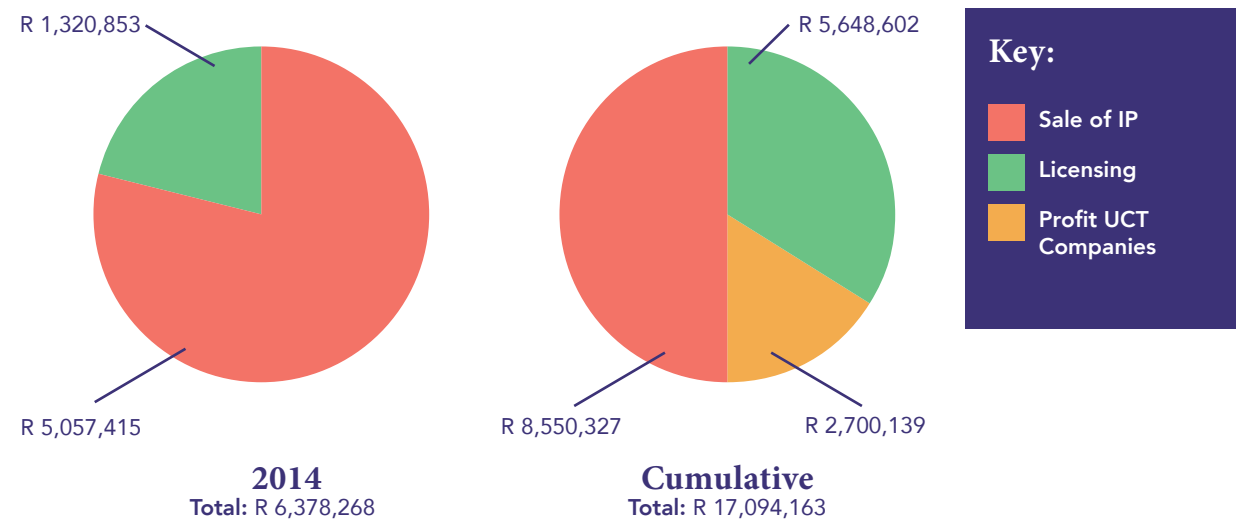
Applications

* – A large portfolio was transferred to spin-off company PST Sensors in February 2012.
 ‡ – The ACE portfolio was only transferred to spin-off company AngioDesign at the end of 2014, so the patent family has been included in the 2014 stats.

IP Commercialisation Revenues



IP Commercialisation Revenues



Key:

- Sale of IP
- Licensing
- Profit UCT Companies

UCT Spin-off Companies

| Year | Brand | Company | Core Focus | UCT Equity | Status |
|------|--|--|---|------------|--------|
| 2004 | Isiqu Orthopedics (Pty) Ltd | Isiqu Orthopedics (Pty) Ltd | Design & manufacture bone & joint implants | No | ✗ |
| 2004 | Cell-Life | Cell-Life | e-Health technology development company | No | ✓ |
| 2006 | CAPECARDENE | Cape Caretone (Pty) Ltd | Food additive for aquaculture (astax asthin) | No | ✗ |
| 2006 | HPT HOT PLATINUM | Hot Platinum (Pty) Ltd | Induction furnace and casting equipment for jewellers / dentists | No | ✓ |
| 2009 | CapeRay | CapeRay Medical (Pty) Ltd | Low dose x-ray coupled with ultrasound for breast cancer detection | Yes | ✓ |
| 2010 | SAT Strait Access Technologies | Strait Access Technologies (Pty) Ltd | Heart Valve and deployment devices for their heart valve repair | Yes | ✓ |
| 2011 | PST SENSORS | PST Sensors (Pty) Ltd | Printed Silicon Electronics - eg. thermistor temperature sensors | Yes | ✓ |
| 2011 | Seraptix CC | Seraptix CC | Biosensor / diagnostic | No | ✓ |
| 2011 | Antrum Biotech Healthcare Innovations | Antrum Biotech (Pty) Ltd | Extrapulmonary TB diagnostic test - rapid, bedside testing | Yes | ✓ |
| 2012 | tuluntulu | Tuluntulu (Pty) Ltd | One-to-Many (users/viewers) live, continuous broadcast to mobile devices | No | ✓ |
| 2013 | ELEMENTAL TECHNOLOGIES | Elemental Technologies IP Holdings (Pty) Ltd | Computational Fluid Dynamics software for advanced simulation | Yes | ✓ |
| 2014 | AngioDesign Next generation therapeutics | AngioDesign (Pty) Ltd | Angiotensin Converting Enzyme (ACE) inhibitor drug discovery | No | ✓ |
| 2014 | DroneSAR (Pty) Ltd | DroneSAR (Pty) Ltd | Precision agriculture based on radar and the use of drones / unmanned aerial vehicles | Yes | ✓ |
| 2014 | HyCAT | HyCat (Pty) Ltd | Hydrogen Fuel Cells | Yes | ✓ |

2014 Spin-off Companies

AngioDesign (Pty) Ltd

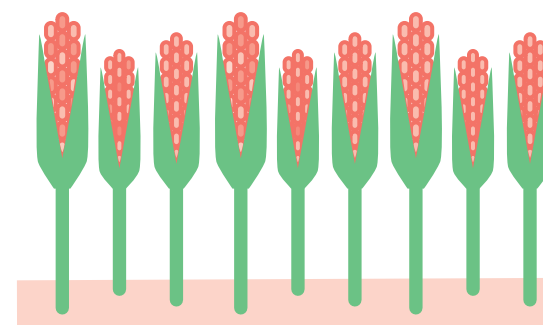
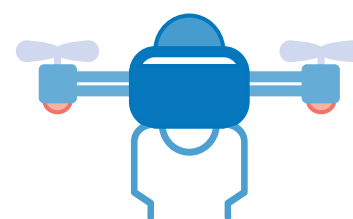


After many unsuccessful attempts to raise local funding to develop the ACE inhibitor drugs invented and patented by UCT, United Kingdom based investors have come on board. This has resulted in the incorporation AngioDesign (Pty) Ltd in the UK.

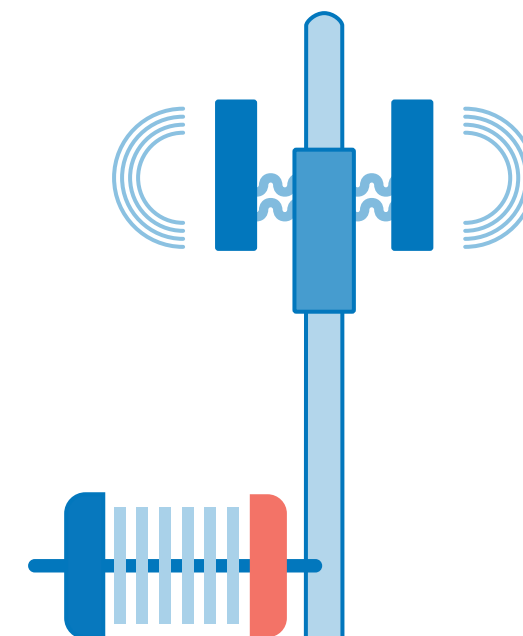
ACE inhibitor drugs are pharmaceuticals used primarily for the treatment of hypertension (elevated blood pressure) and congestive heart failure. Those currently available have a number of adverse effects such as dry cough, headaches, etc. which will be absent in the case of our invention.

AngioDesign entered into an assignment agreement with UCT relating to the four patents, and the deal, in addition to reimbursing UCT for patent costs, provides for milestone payments as the inhibitor drugs move through clinical trials.

Another good outcome is that AngioDesign will still make use of UCT's staff and facilities in the further development of the drugs.



HyCat (Pty) Ltd



HyCat (Pty) Ltd, currently an entirely UCT owned company, was formed as an IP holding company and commercial vehicle of UCT's current and future fuel cell technology portfolio. These technologies flow from the Department of Science and Technology-funded hydrogen fuel cell Centre of Competence, "HySA Catalysis", hosted in the Department of Chemical Engineering.

HyCat will play a key role in in-licensing foreign IP to form the platform onto which South African innovations can be embedded so as to spring-board innovation. HyCat will develop the South African hydrogen fuel cell supply chain, unlocking increased value for the country's platinum resources. Through this, manufacturing jobs, a service industry and secondary businesses will be created. Through strategic partnerships HyCat will seek to ensure that South Africa plays a leading role in fuel cell technology at an international level.

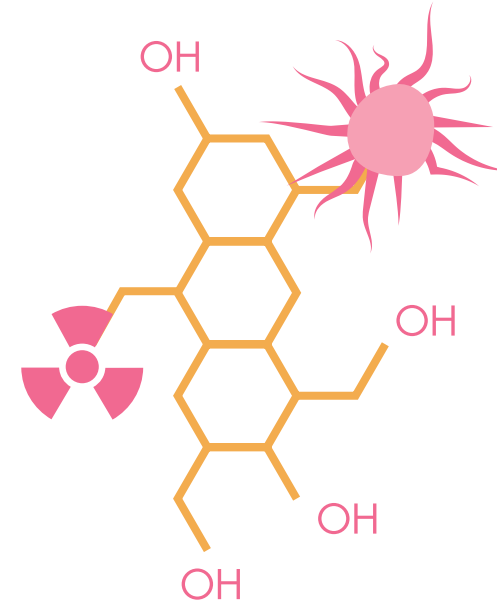
DroneSAR (Pty) Ltd

DroneSAR (Pty) Ltd was formed to commercialise 'know-how' in radar technology generated over a decade in the Department of Electrical Engineering. One of the first applications of radar to drones will focus on the requirements for applications such as precision agriculture. IP will be developed primarily as software and a close relationship will be maintained with the department. UCT was granted equity in this spin-off company in recognition of the know-how generated within the university.

Selection of New Provisional Patents Filed

No. 1

New Provisional Patent –



GluCAB™ - Directed Cancer Therapeutic



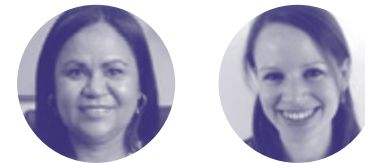
In collaboration with a team at NECSA, Prof Iqbal Parker (IDM), Prof Roger Hunter (Chemistry) and their PhD student Cathryn Driver, developed a molecule for next generation chemotherapy.

The molecule is designed to operate via a two-stage mechanism. The first component of the GluCAB™ molecule identifies cancerous cells due to their surface signatures and binds to them, distinguishing them from normal cells. Thereafter the second radionuclide component provides therapeutic doses of ionizing radiation to kill malignant tumour cells using ionizing radiation. This provides very focused treatment and minimises the impact on healthy normal cells. The molecule can also aid imaging of the cancerous cells.

No. 2

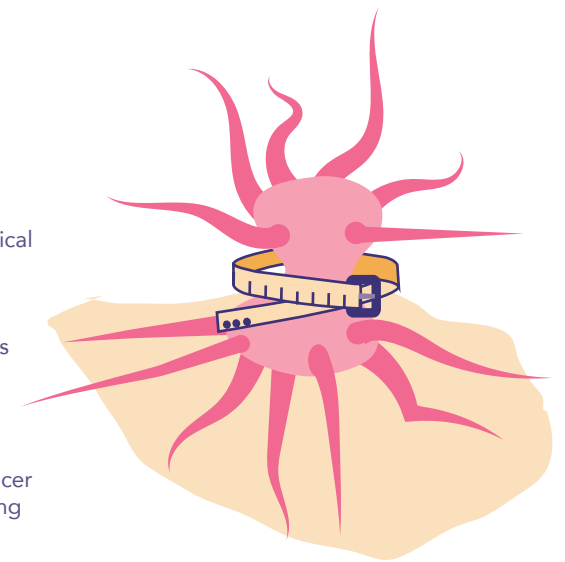
New Provisional Patent –

New Anti-Cancer Drug Lead



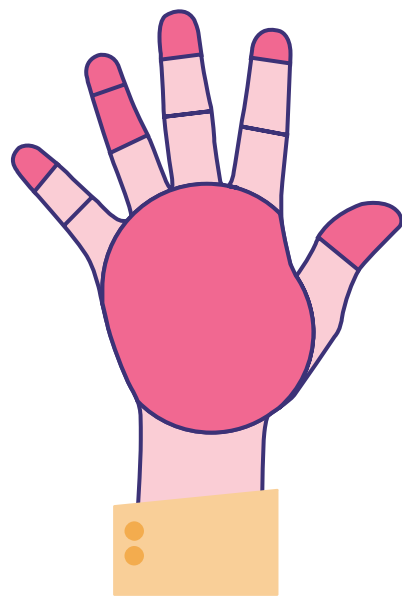
In a second invention directed at cancer treatment, scientists from the medical Biochemistry department Prof Virna Leaner, Dr Pauline van der Watt and student Catherine Stowell (enabler), collaborated with Louville University (USA) and discovered a chemical compound that inhibits the activity of Karyopherin Beta¹. Karyopherins are a group of proteins involved in transporting molecules and can act as importins (i.e. helping proteins get into the nucleus) or exportins (i.e. helping proteins get out of the nucleus).

Normal metabolic activities in active cells requires continued import and export of proteins and growth factors. Inhibition of Karyopherin Beta¹ protein in cancer cells could potentially halt the "import" activity starving the cells and killing the cancerous tumour.



No. 3

New Provisional Patent –



Mechanical Prosthetic Hand



Mechanical Engineers, Dr George Vicatos and his MSc student Severin Tenim have developed light-weight, mechanically operated hands that offer far greater functionality than competitors in the low-cost market – ideal for the South African public sector. Whilst many younger amputees favour the “bionic” look of prosthetics, current development will look like a more conventional glove that will simulate a hand.

The fingers can grasp a variety of objects and are able to sequentially close onto a curved object like a ball or glass, before locking in place. The thumb can be locked into a number of positions which facilitate different grips. The hand is actuated by pulling a cord which is achieved by the user flexing a shoulder harness.

No. 4

New Provisional Patent –

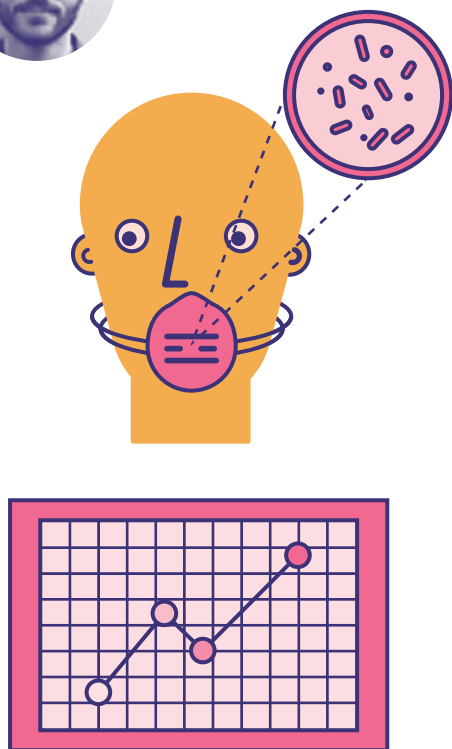
Smart Mask Monitors & Prevents TB Spread



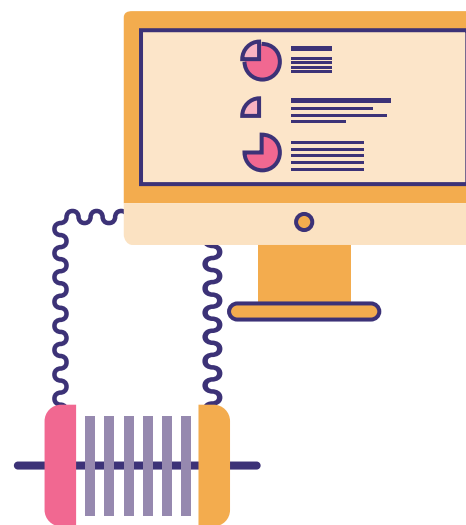
Despite Drug Resistant (DR)-TB comprising only 2.2% of the case burden, it consumed ~45% of the total estimated national TB budget. The infectiousness of many DR-TB patients is also extremely high - the so-called “superspreaders”. In an ideal world, superspreaders should be isolated from society, but in practice it does not happen.

UCT inventors (Prof Keertan Dheda, Dr Lester John, Dr Sudesh Sivarasu and Dr Grant Theron in Biomedical Engineering and Pulmonology) have developed a smart mask that's first priority is to limit disease transmission, but also, through various environmental and physiological sensors monitoring compliance, determine the infectious risk to others in a community. An SMS alert function reminds patients to put on the mask.

Whilst the current focus is on TB in the Western Cape context, its application is not limited to this and can also be used in the same way to contain and monitor the spread of other potential diseases, e.g. flu.

No. 5

New Provisional Patent –



Assessing the Condition of a Fuel Cell



A fuel cell converts hydrogen and oxygen into water, and in the process also creates electricity. It is an electro-chemical energy conversion device that produces electricity, water, and heat. A variety of different fault conditions such as drying and flooding or fuel starvation can arise reducing performance and sometimes even causing permanent damage of the fuel cell.

An industry standard for monitoring of fuel cells to determine their “state of health” is Electrical Impedance Spectroscopy (EIS), which involves injecting a range of voltage or current waveforms of varying frequencies into the cell, measuring impedance responses, and plotting impedance as a function of frequency (the Nyquist plot).

Dr Paul Barendse and his PhD student Chris de Beer (Department of Electrical Engineering) have invented a low-cost, compact and scalable hardware platform that is able to determine the impedance spectrum far more rapidly than conventional impedance analysers (e.g. EIS). It has been shown to work under various fuel cell fault conditions and can also determine the operational state of other electricity-producing cells.

No. 6

New Provisional Patent –

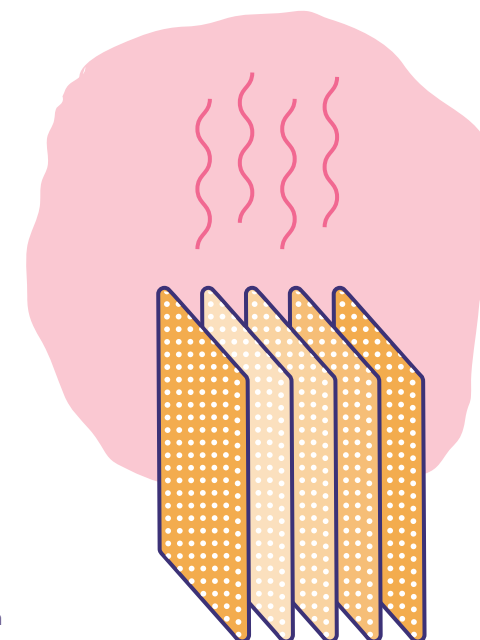
Metal Gas Diffusion Layer for a Hydrogen Fuel Cell



This new provisional patent application is the second of a number of patents that will be filed around advanced fuel cell technology developed by HySA, the Department of Science and Technology Hydrogen Fuel Cell Centre of Competence in Chemical Engineering.

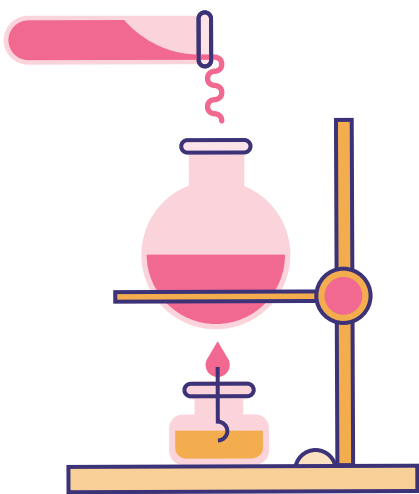
The gas diffusion layer (GDL) is a porous and electrically conductive material that is located between the catalyst and bipolar plates in a fuel cell and it provides pathways for the reactant gases to reach the catalyst layer and for the resultant water to flow from it. Current GDLs are made of randomly dispersed carbon fibres with a wide pore size distribution. When compressed, the gas permeability is reduced and water can build up in the pores leading to ‘flooding’.

The UCT invention of Dr Shiro Tanka and Nabeel Hussain includes a microporous layer (MPL) on a porous, metal gas diffusion layer, which prevents water accumulation. The metal GDL improves the diffusion of gases to the catalyst layer and the design allows for more uniform pressure application, resulting in improved overall performance of the cell. In addition, the higher thermal conductivity of the metal makes it possible to apply this to higher temperature fuel cells.

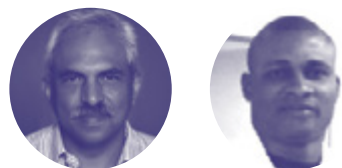


No. 7

New Provisional Patent –



Production of Potent Anti-oxidant Ergothioneine



Prof Anwar Jardine's (Chemistry) latest invention, with his student, Lutete Khonde, is an improved process for the biochemical synthesis of the potent antioxidant ergothioneine (ESH), its intermediates and derivatives. ESH is a key anti-oxidant in the lifecycle of *Mycobacterium tuberculosis* which causes TB.

Although the general biochemical process is known, the key difference is that the new process starts with commercially available N-benzyl-protected histidine rather than the unprotected form. The protection of the histidine allows more stable intermediates to be produced, shortening and simplifying subsequent process steps. When operating at room temperature an overall synthesis yield of 80% is achievable, which is significantly better than other current processes.

Apart from the main process, the inventors have also synthesised the S-(β -amino- β -carboxyethyl) ergothioneine sulfone which could serve as an inhibitor of ESH synthesis, or be useful in designing other inhibitors of enzymes in the ESH pathway. These inhibitor drugs could make the microorganism more sensitive to treatment regimes, tackling the increasingly important issue of drug resistance.

No. 8

New Provisional Patent –

Improving image quality in MRI Scanners by correcting for magnetic distortions



A Magnetic Resonance Imaging (MRI) scanner applies magnetic fields to a human or animal to image a specific region of the body. Due to a number of internal and external effects these fields are never completely homogenous. Distortion of the magnetic fields may lead to defective images which could potentially lead to false diagnoses. Also, during the course of an MRI scan there is typically a level of magnetic drift which reduces the image quality.

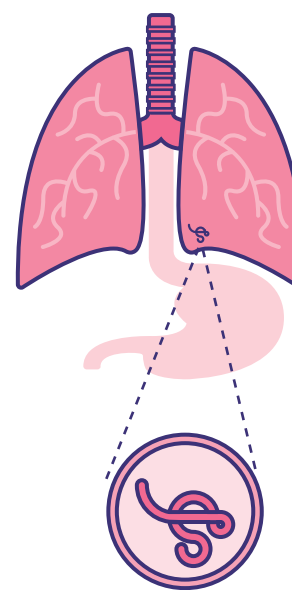
It is therefore important to estimate and correct for inhomogeneity in the magnetic field and modern scanners adjust for this through a process called "shimming". The shim device in most MRI scanners comprises a number of coils that produce small magnetic fields which are superimposed on the main magnetic field. Shimming is performed once, and typically before the scan sequence begins. During a long scanning period, however, the shim requirement may drift rendering the final MRI images inaccurate.

Dr Ali Alhamud, Prof Ernesta Meintjies (CUBIC) and a collaborator from MGH (a Harvard-affiliated hospital) developed a method that estimates and corrects for main magnetic field drift allowing for shim correction during the course of an MRI scan. A double volumetric sequencer navigator is used to measure and adjust shim over selected regions in a "slab-by-slab" fashion. This ultimately improves the quality of images produced.



No. 9

New Provisional Patent –



Treatment of Nematode Infection



Parasitic infections are major veterinary and public health problems and nematode ("round worm") infections in particular are only effectively treated by a small range of pharmaceuticals. There are widespread issues with drug resistance and vaccines for parasitic nematode infections are not presently available. Gastrointestinal nematode infections are amongst the most prevalent infection of humans worldwide with an estimated 3.5 billion cases of which 450 million individuals are seriously ill as a result.

Dr William Horsnell (IDM) and collaborators from Southampton University found that the administration of Surfactant Protein D (SP-D) to a person or an animal, with parasite infection reduces the parasite burden and can also be used preventively. SP-D is primarily expressed in the lung, but it has been detected in other parts of the body. In the lung it maintains the normal functioning and physiology of the lung and has a role on immunology. The SP-D will be produced by recombinant microorganisms so that it can be formulated and administered as a new method of treatment.

No. 10

New Provisional Patent –

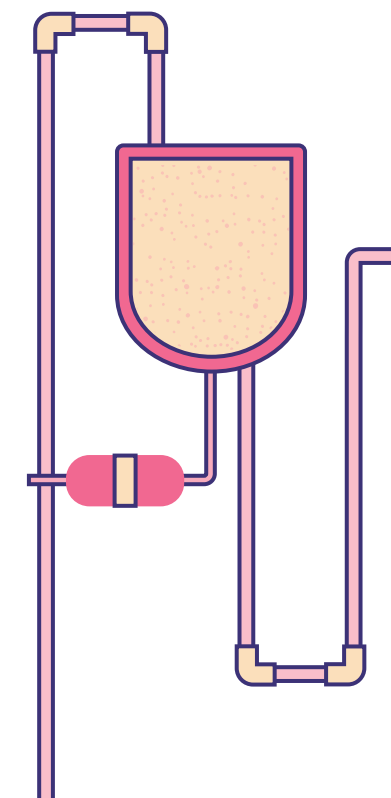
Biotransformation of Linear Alkanes



Large stockpiles of linear hydrocarbons have arisen as by-products from the global expansion of gas-to-liquid refining processes. There is particular research focus on deriving valuable products from these linear alkanes, which feature some of the strongest chemical bonds in nature and typically are of a low value due to their inertness.

Femi Olaofe, Dr Carryn Fenner and Prof Susan Harrison from the Centre for Bioprocess Engineering (CeBER) built on existing EnBase[®] technology to apply it to enhance enzymatic biotransformation processes for the production of valuable oxygenated chemicals, such as alcohols, ketones, aldehydes, hydroxyacids and dicarboxylic acids, from alkanes. They have found that in contrast to conventional processes, growing whole microorganisms can be used as the biocatalyst leading to a significant increase in catalyst efficiency and activity.

Applying the technology to the biotransformation of alkanes has resulted in a number of unexpected advantages. For example, co-factor regeneration (a typical problem in conventional processes for the biotransformation of alkanes) has been improved through the stable supply of glucose through EnBase[®]. Also, when using growing cells (log phase) as opposed to resting cells (stationary phase), the inventors achieved a 40% increase in catalyst efficiency and 1.8 times catalyst activity. This was unexpected as resting cells are widely considered to be about 50% more efficient than growing cells in biotransformation processes.



Future Society

Key - Future Society

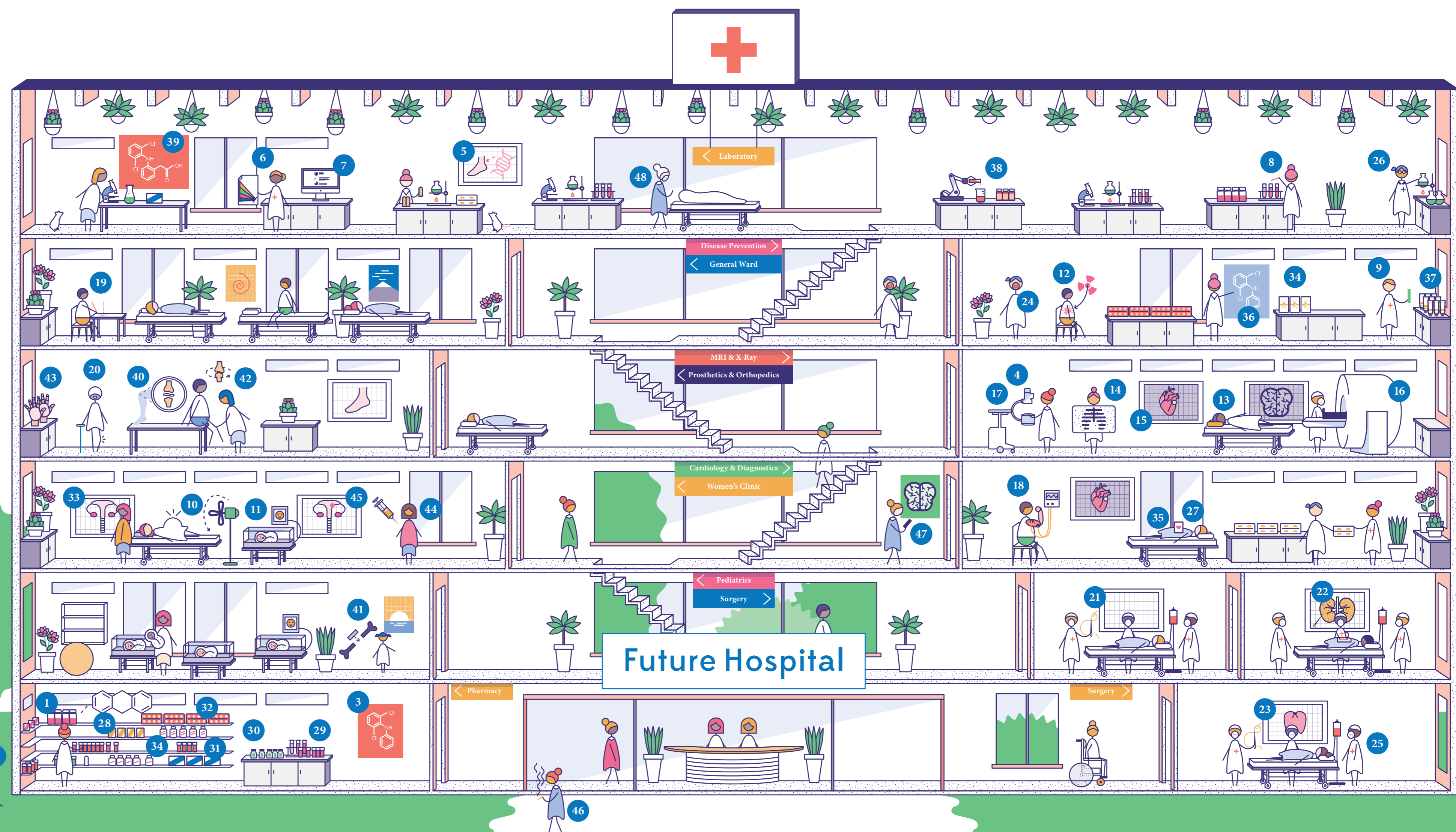
- | | | | |
|----|---|----|--|
| 1 | Drought tolerant crops: stress inducible plant promotor | 19 | Excel-based modeller for determining mass and energy balances for industrial bioprocesses |
| 2 | Drought tolerant crops: Multi-gene cassette | 20 | Technique to identify diamonds based on natural inclusions |
| 3 | Probiotic for farmed abalone | 21 | Process for the biotransformation of linear alkanes |
| 4 | Ostrich Probiotic | 22 | Device for measuring gas and solution flow streams in heap leaching operations |
| 5 | Recovery of anti-oxidants from olive wastewater | 23 | Heat treatment of low-solute platinum alloys |
| 6 | Vaccine againsts Beak and Feather Disease in parrots | 24 | Induction furnace technology for casting hot platinum |
| 7 | Modified chitosan polymer for use as catalyst support | 25 | Method of hardening of platinum alloys for new applications |
| 8 | Silver modified chitosan polymer support for use in argentation chromatography | 26 | Method for recovery of base metals and precious metals from chemical processing |
| 9 | Shack fire detector | 27 | Production of nitrogen products during Fischer-Tropsch processes |
| 10 | Inexpensive method of printing semi-conductors on practically all surfaces (various IP) | 28 | Process for improving selectivity of production of nitrogen products during Fischer-Tropsch processes |
| 11 | Symbiotic radar and communication system | 29 | Sensor for sensing position of objects in industrial machinery |
| 12 | Optimal wireless communication | 30 | Improved flotation process |
| 13 | Filters to regulate congestion in a data network | 31 | Stable metal cluster complexes for better catalysts |
| 14 | Monitoring of electricity-producing cell condition | 32 | Novel in-situ cell for use in reaction studies in a laboratory x-ray diffractometer |
| 15 | Clamp for optimal stacking of fuel cells | 33 | Magnetometer for characterising gas streams during reactions where ferro-magnetic particles are involved |
| 16 | Improved gas diffusion layer for fuel cells | 34 | Process for treating mine waste water |
| 17 | Optimal current injection to / extraction from a utility network | 35 | Process for treating waste water by using eutectic freeze technology |
| 18 | Mouldless Manufacturing | | |



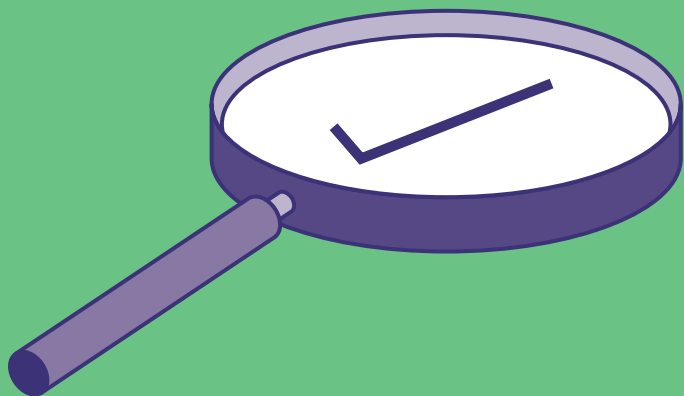
Future Hospital

Key - Future Hospital

- | | | | |
|----|--|----|--|
| 1 | Phenothiazine-based anti-TB drugs | 25 | Device to assist doctors during surgery to view chest interior of TB-infected patient |
| 2 | Improved UV protectant | 26 | Improved method for synthesising the powerful anti-oxidant Ergothioneine |
| 3 | Compound to reduce HIV infection | 27 | Inhibitor for treatment of heart disease (ACE) (various IP) |
| 4 | Method of early cancer diagnosis | 28 | Garlic nutraceutical |
| 5 | Genetic markers for determining risk of achilles tendon damage | 29 | Anti-malarial drugs (amino-pyrazines) |
| 6 | Detection of various analytes using Raman spectroscopy | 30 | Anti-cancer drugs |
| 7 | Detection of unsaturated fats and vitamins in complex oil based mixtures | 31 | Anti-malarial drugs |
| 8 | Biomarker to distinguish between active and latent TB | 32 | Anti-TB drugs |
| 9 | Test strip for diagnosis of pleural TB infection | 33 | Method of treating cervical cancer |
| 10 | Fan to prevent brain injury in babies during labour | 34 | Anti-malarial drugs (dibemethins) |
| 11 | Medical device to infer emotional state of babies | 35 | Second medical use of Resveratrol for treatment of heart failure patients |
| 12 | Glucab Bone Agent | 36 | Molecule for HIV prevention (Various IP) |
| 13 | Head stabilising MRI cushion | 37 | Treatment for nematode (parasitic roundworm) infection |
| 14 | Method of cross-correlation to image moving objects (e.g.blood) in human bodies | 38 | New method for particle size reduction of nevirapine (HIV treatment) |
| 15 | Improving image quality in cardiac MRI scans by correcting for respiratory motion | 39 | Inclusion complex of diclofenac as anti-inflammatory |
| 16 | Improving image quality in MRI scans by correcting for field distortions | 40 | Improved knee meniscus prosthesis |
| 17 | X-ray mammography scanner with improved image quality | 41 | "Bone implant for children capable of "growing" with the patient" |
| 18 | Method and device for improved calculation of electromyography (EMG) of deep muscles | 42 | Rotating hinge knee prosthesis and proximal femur hip prosthesis |
| 19 | A device to aid in handwriting rehabilitation of stroke patients | 43 | Mechanical prosthetic hand |
| 20 | Device that facilitates patient support when imaging or examining injury on a patient's hip, knee or leg | 44 | Vaccine against Human Papillomavirus infections and resulting cervical cancer (various IP) |
| 21 | Medical device to assist plastic surgeons with suturing of lips | 45 | Biomarker for detection of sexually transmitted infections |
| 22 | Navigation device to assist with accurate needle placement during kidney stone operations | 46 | Cognitive Training (Curb Your Addiction app) |
| 23 | Distraction device for reconstruction of the human maxilla | 47 | Smart phone application for screening neurocognitive impairments |
| 24 | Smart mask for limiting transmission of airborne disease (e.g. TB) | 48 | Electronic device to calculate post-mortem interval of a corpse |



NIPMO Support and Special Projects



The National IP Management Office (NIPMO) was established to implement the Intellectual Property Rights from Publicly Financed Research and Development Act and it supports UCT and RCIPS in a number of ways. Through the IP Support Fund, which allows UCT to claim back up to 50% of expenses incurred for the protection of our portfolio, it provided R1,5m. This support is valuable and significantly extends UCT's ability to protect and maintain our IP portfolio.

NIPMO has importantly also provided funding to increase capacity in terms of personnel as well as to undertake strategic projects and IP awareness raising activities. A new three-year funding agreement worth R8.3m, will continue to support strategic projects and has most significantly enabled RCIPS to appoint a new team that is focussed on the technology development, marketing and the commercialisation end of the innovation spectrum.



Unlocking Medical Device Innovation at UCT

A considerable number of medical devices have been invented at UCT. A third of the university's spin-off companies are based on medical devices and certainly in the South African environment medical devices offer the greatest chance of success for new businesses.

In 2013 UCT's pharmaceutical IP portfolio and activity was reviewed which led to an entirely new approach and paradigm. With a similar objective of unlocking the potential for medical device innovation, this was selected as a focus area of a 2014 NIPMO-funded strategic project.



A first step in this initiative was to bring all the role-players together in a workshop to discuss the medical device landscape at UCT with specific regard to R&D and commercialisation. Different perspectives were shared: inventors, service providers involved with UCT (regulatory, intellectual property, prototyping and manufacture), UCT spin-off companies as well as those providing teaching and research supervision in the faculties of Health Sciences and Engineering

and the Built Environment. This highlighted interesting strengths and weaknesses and identified how the medical device development community can work together to optimise innovation in this space. It is hoped that at a later stage, there will be more 'regional' engagement. In fact, even though this was a 'closed' UCT meeting, requests to attend came from as far abroad as Nigeria and the United Kingdom.

An external review of UCT medical device IP portfolio was also initiated during December 2014. Whilst providing insight into individual cases, especially from a regulatory requirement perspective, key guidelines were developed that will assist in the selection of devices with potential and the development of these products going forward.

The key learnings from this strategic project are being captured in a booklet "Route to Market: Medical Devices" that will act as a guide to researchers and medical device innovators at UCT of the path that they need to navigate to achieve success. Further workshops will be held with a view to growing and strengthening the Western Cape medical device sector and it is evident that this is being strongly supported by Provincial Government and economic development agencies such as Wesgro.

UCT PreSeed Fund in Perspective

“Seed funding needs to build a bridge to the next fundable investment position and not create a pier that ends in the middle of nowhere”

– Dr Jeff Skinner, London School of Economics



The RCIPS PreSeed Fund, launched in 2008, aims to provide hard-to-get financial support for early stage technology development and to bridge the funding gap that exists in the innovation chain, before other funding streams can be accessed or to enable a rounded technology package to be developed that can be successfully commercialised.

There are two levels of funding:

- Explorer – support projects with up to R20 000
- Concept – support projects with up to R100 000

The first seven years' experience in operating the PreSeed Fund is overviewed in this section and several successful projects have been profiled. In the detailed review, which has been reported on separately, the individual project outcomes were assessed and encouragingly “successful” outcomes were seen in 73% of the Explorer projects and 50% of the Concept projects, underscoring the positive impact of the funding and its need.

Preseed Fund:

91
Applications

65
Projects funded

R 500,000
Annual Budget

2008
Started

Projects Outcomes Classification [Key to Pie Charts]

Successful: Project objectives were achieved. This could mean that the work moved on to other funded development, or was commercialised, or is currently in an innovation fund-raising stage, or that the PreSeed funded evaluation established that the work should not be pursued (e.g. a techno-economic analysis indicated that the technology was not commercially viable).

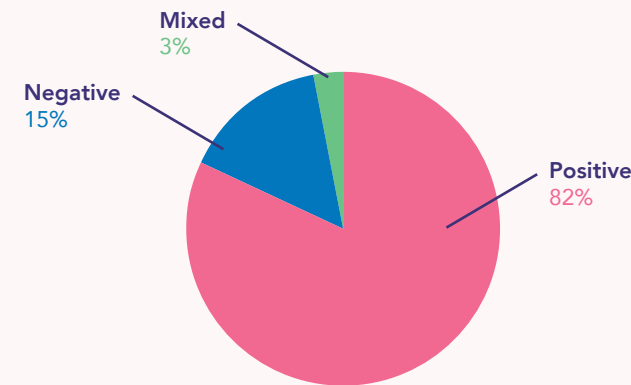
Mixed: This is where there were certain positive and negative aspects, indicating that the project did not have an entirely ‘successful’ outcome and the full project could not immediately move forward as originally envisaged.

Negative: Project objectives were not achieved.

On-going: Project has not been completed yet

Terminated: Funding was approved but project was not started or had to be terminated due to an adverse event.

Explorer Fund Projects: Outcomes since 2008



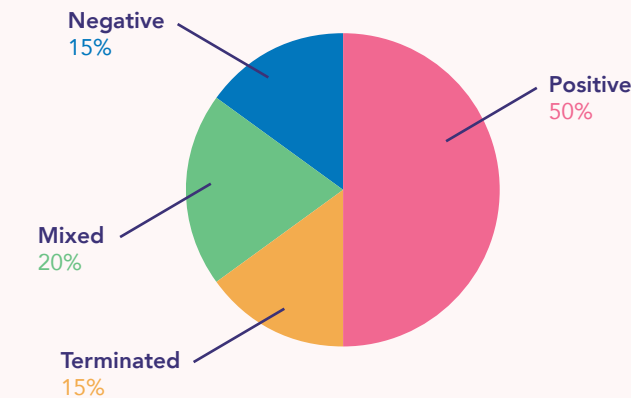
Explorer Fund:

48
Applications

40
Awards

R 625,000
Invested

Concept Fund Projects: Outcomes since 2008



Concept Fund:

60
Applications

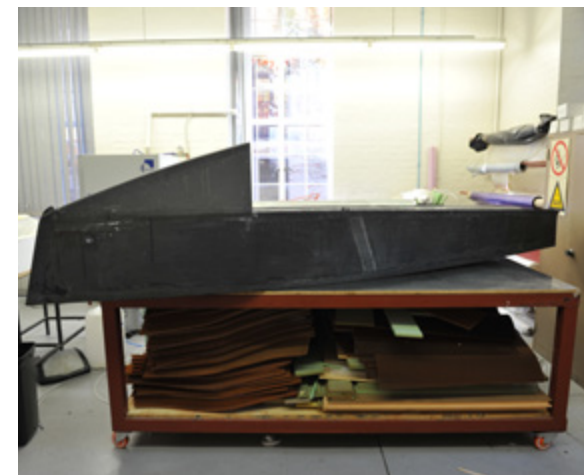
29
Awards

R 2,700,000
Invested

Concept PreSeed Fund Project Profiles



Mouldless Manufacturing of Boats



Dr Chris von Klemperer (Department of Mechanical Engineering) has developed a "mouldless manufacturing" technology that has particular application to boat hull manufacture, on-board housings, etc. The major advantage of the technology is the ability to create curved surfaces without the use of expensive moulds. The aim of this project was to create a prototype that would both demonstrate the technology and attract potential investors and an international moth sail boat hull was selected for this purpose.

Pre-award, RCIPS conducted extensive market research and found great affinity for the concept from the marine industry. The outcome was also very positive and a joint funding application, with an industry partner, was made to the new Marine Manufacturing Industry Innovation Fund (MMIIF). If awarded funding, the first market prototype of the technology for a specific market niche.

UCT College of Music – Record Label



The UCT College of Music (CoM) has become entrepreneurial. An environment has been created for staff and students' own original music to be marketed and distributed under the record labels "SACM Productions" (University of Cape Town South African College of Music Productions) and UCPR (University of Cape Town South African College of Music Project Recordings).

Besides the financial contribution, RCIPS has assisted the CoM with market research, the development of a business strategy and the registration of trademarks. To date two albums have been recorded and are distributed through CDBaby (iTunes is also planned) as well as at concerts. One further CD is currently in the pipeline.

It is foreseen that all returns will be used to acquire new equipment and instruments as well as contributing to the training of students in music production.

SAFE Card



Although not a project with any real commercial value, PreSeed funds were awarded based on the potential social value of the application - SAFE Card is a cell phone-based application to provide guidance and support to survivors of sexual offences.

Research done by Dr. Kelly Moutl of the UCT Gender Health & Justice Research Unit (GHJRU) and her partners has shown that there are significant challenges for rape survivors during the criminal justice process and in managing their physical health and psychosocial well-being after such an incident. One of the most critical findings of the research is that there is a tremendous deficiency in information for victims of sexual offences, including information about criminal justice processes, court dates, medical treatment and the like

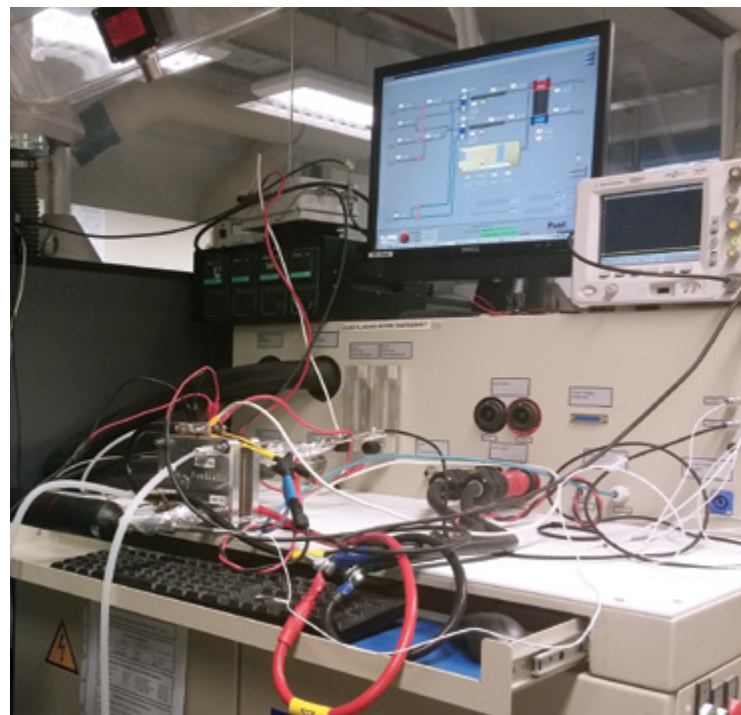
This application therefore not only guides the victims, but also allows them to record essential information during the process. Existing social media platform technology is used, which allows the information to be kept confidentially on the phone in such a manner that it cannot be accessed by another user of the phone. The technology also enables a link to be maintained even if a phone number changes. Case managers from supporting agencies can use the app to update case status and maintain contact on an ongoing basis.

The first version of the application, funded through the Concept fund, worked very well in a simulated environment. Additional financial resources are, however, needed to implement this technology.

The project has the support from Rape Crisis Cape Town Trust, PATCH and the Khayalitsa Thutuzela Forensic Centre.

Explorer PreSeed Fund Project Profiles

OBIS Technology Field Trial

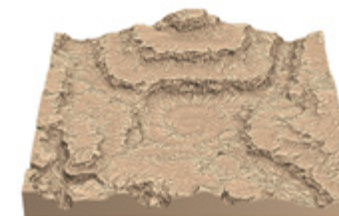
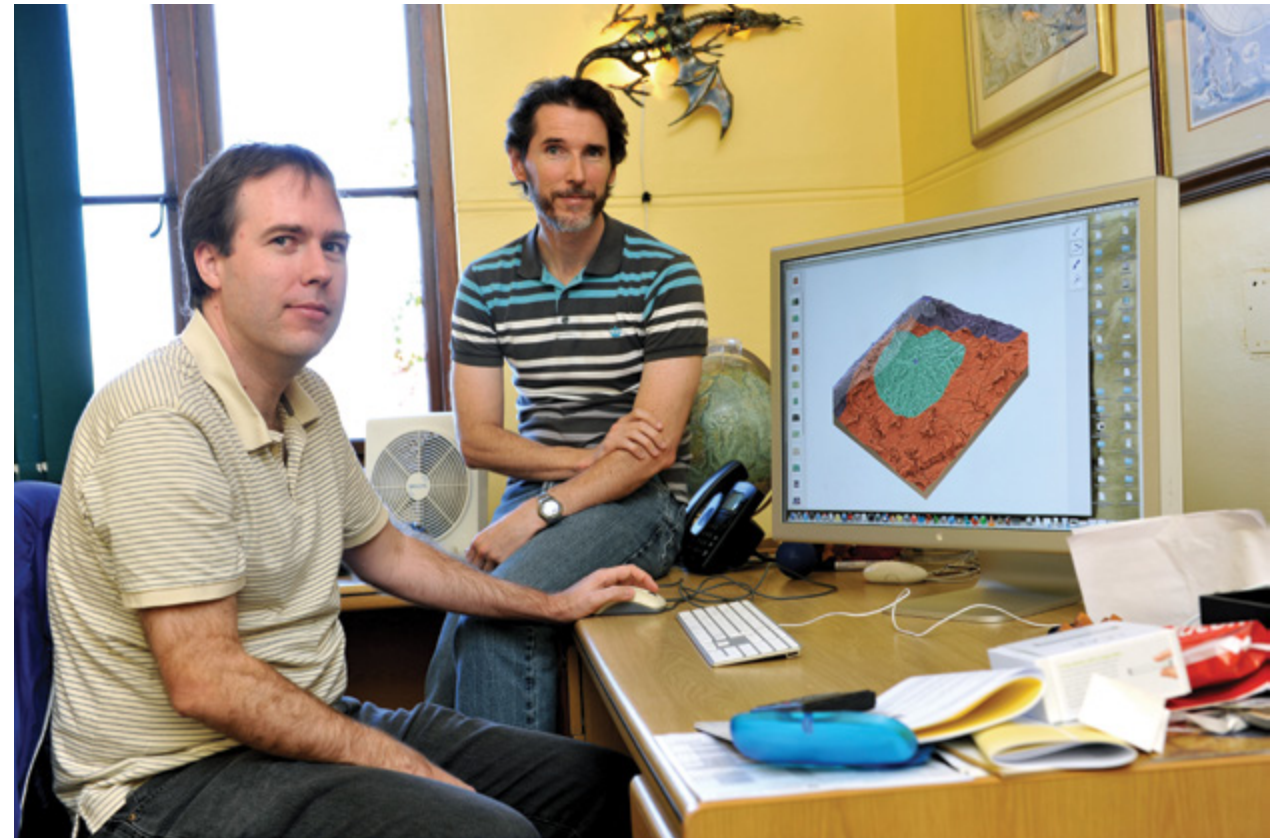


The Optimised Broadband Impedance Spectroscopy (OBIS) technology measures the state of health of a fuel cell device.

The Explorer project allowed this very early stage technology, which before had only been tested in computer simulations, to be tested on a commercial fuel cell stack. The project was successful with an excellent demonstration of the technology that will assist the next phase of commercialisation. It also identified a potential route to market and synergies with HySA and spin-off company HyCat (Pty) Ltd are being explored.

Another positive outcome of the project is that it has forged collaboration between the inventors in Electrical Engineering and the HySA Catalysis, the hydrogen fuel cell research group in Chemical Engineering,

Realistic Virtual Terrain Competitor Assessment



Prof James Gain and Dr. Partick Marais (Computer Science) have developed a realistic digital terrain design software package for application in gaming and films (including futuristic landscapes). Considering the competitiveness in this market it was important to compare this offering with other products in this space, before embarking on a business development plan and commercialisation.

The Explorer funds firstly allowed the project team to purchase and analyse competitor products and secondly to investigate the competitors' marketing channels. The outcome was an informed SWOT analysis, which enabled the team to improve their technology and tailor the end product for an identified niche in the market.

The refined commercialisation strategy was built into a successful application, to the value of R500 000 to the UCT TIA Seed Fund.

UCT TIA Seed Fund

2014 saw the launch of the Technology Innovation Agency (TIA)'s Seed Fund. This is a fund from which higher education institutions (HEIs) and science councils (SCs) can access initial funding to enable them to develop their ideas into fundable applications. R25 million was made available for investments. This fund is expected to expedite funding to projects that require less than R500 000 in funding and to grow the TIA investment pipeline. The approval committees are based at the HEIs or SCs and comprise of both the HEI or SC and TIA members. This deployment will reduce evaluation costs for TIA whilst speeding up the application process for HEIs and SCs.

The first two calls for proposals for the “UCT TIA Seed Fund” attracted a high level of interest with 25 applications being received for funding. A Steering Committee was appointed to assess the applications and 9 applications were awarded funding.

The following table provides a summary from the 2014 inaugural UCT TIA Seed Fund investment, whether a project is developing existing IP, or creating new IP and the expected route to commercialisation.

| Title | Principle Investigator | Sector | Expected Commercialisation Route | Generating New IP | Building on Previous IP |
|--|--|------------------|----------------------------------|-------------------|-------------------------|
| Phycocyanin Production | Prof Sue Harrison | Aquaculture | Spin-off Company / Licence | X | |
| Radio Camera / Radar | Dr Alan Langman | Agriculture, ICT | Spin-off Company | X | |
| Coalgae Extraction | Prof Jack Fletcher | Oil & Gas | Via NMMU spin-off company | | |
| Plant Transformation without Antibiotics | Dr Suhail Rafudeen | Bio-technology | Licence | X | |
| Phenothiazines | A/Prof Muazzam Jacobs | Pharma | Licence | | X |
| Lumkani | Samuel Ginsberg / David Gluckman | Residential | Spin off Company | | X |
| XRD Cell Certification | Prof Michael Claeys | Chemical | Spin off Company | | X |
| H2 Fuel Cell | Dr Sharon Blair | Aviation | Spin off Company | X | X |
| Biological Implant | Dr Rushdi Hendricks / A/Prof Deon Bezuidenhout | Healthcare | Licence | X | |

A number are still in progress, but most of the projects are yielding pleasing outcomes.

Collaboration is a key ingredient of successful innovation and the TIA Seed fund projects have certainly stimulated collaboration. The H2 Fuel Cell project brought about new collaboration between an external company, Fly H2 Aviation and the HySA Catalysis Centre of Competence headed by Dr Sharon Blair in Chemical Engineering. Through knowledge of related activities, RCIPS was able to bring Prof Arnaud Malan in Mechanical Engineering into the consortium, with his expertise in computational fluid dynamics and unique code “Elemental”. This has sparked additional collaboration beyond the TIA Seed project. In addition, whilst not immediately involved in the Seed project, there will be future linkages with UCT spin-off DroneSAR (and a team in Electrical Engineering) through their common interest in drones / unmanned aerial vehicles (UAVs).



RCIPS - Commercialisation Team

The Commercialisation Team supported by NIPMO funding include: a Business Development Manager (Dr Revel Iyer), a Project Manager (Francois Oosthuizen) and a Marketing Intern (Jayde Barends). The team work closely with the IP Management Team providing market research insight for patenting Gate Reviews as well as identifying leads for commercialisation of IP. Importantly too they have increased the capacity of RCIPS to efficiently move technology through the innovation space, into fundable opportunities.



Left to right: Dr Revel Iyer, Jayde Barends, Francois Oosthuizen

Francois Oosthuizen is providing closer monitoring of the UCT PreSeed funded projects and assisting Principle investigators to overcome obstacles where necessary, which should improve their timelines and throughput. His appointment was timely as the Technology Innovation Agency's seed funding programme to universities was launched in 2014, which has required significantly more input in overall project "design" and management. Both the PreSeed Fund and UCT TIA Seed Fund initiatives are discussed elsewhere in this booklet.

In conjunction with Revel Iyer, the Business Development Manager, the RCIPS team spends time with inventors and entrepreneurs developing business propositions and strengthening funding applications that will lead to next-round innovation funding or the creation of spin-off companies. New sources of innovation funding will continuously be researched and made available to the UCT community and the focussed approach will ensure the efficient use of resources.