Global Genomic Medicine Collaborative

4th Global Genomic Medicine Collaborative Conference

Genomic Medicine Implementation in Low Resources Settings

November 28-30, 2018

President Hotel
President Ballroom
4 Alexander Road
Bantry Bay, Cape Town, 8001, South Africa

Dear G2MC Cape Town Meeting Attendees

Welcome! We are excited to host you at the ***4th Global Genomic Medicine Collaborative Conference*** *Genomic Medicine Implementation in Low Resources Settings in beautiful Cape Town, South Africa, organized by the Global Genomic Medicine Collaborative and the* ***University of Cape Town*** *as the local host and the* ***Golden Helix Foundation****, as G2MC partner.*

This conference is the G2MC's first to be organized in Africa, following the successful events in the United States in 2014, in Singapore in 2015 and in Athens in 2017 and will focus on the implementation of Genomic Medicine in low resource settings, in particular in low- and middle-income countries and in limited resources settings. We are pleased to have lined up an impressive cast of speakers to address specific topic areas that contribute to the effective implementation of genomic medicine in these varied settings.

We welcome the leaders in Genomic Medicine ***across the globe*** *to participate in this highly interactive meeting to define collaborative projects and strategies that will serve the global community to* ***use genomic advances to improve clinical care****. Representatives from the developed and the developing world will share challenges and strategies to overcome them. In addition, we will convene industry and leaders of large genomic consortia to engage in the dialog about the potential to impact health care delivery.*

We encourage you to review the accompanying agenda as we are also excited to host a ***Young Investigator Forum*** *on the morning of 28 November to showcase the original research of young investigators through oral presentations and posters. We encourage you to attend this morning session and join us for a lunch and poster session just prior to the start of the main meeting.*
As the G2MC is a growing but nascent organization, we plan to lean on the collective expertise of our speakers and attendees to help us crystallize our goals and create some impactful activities in the years to come.

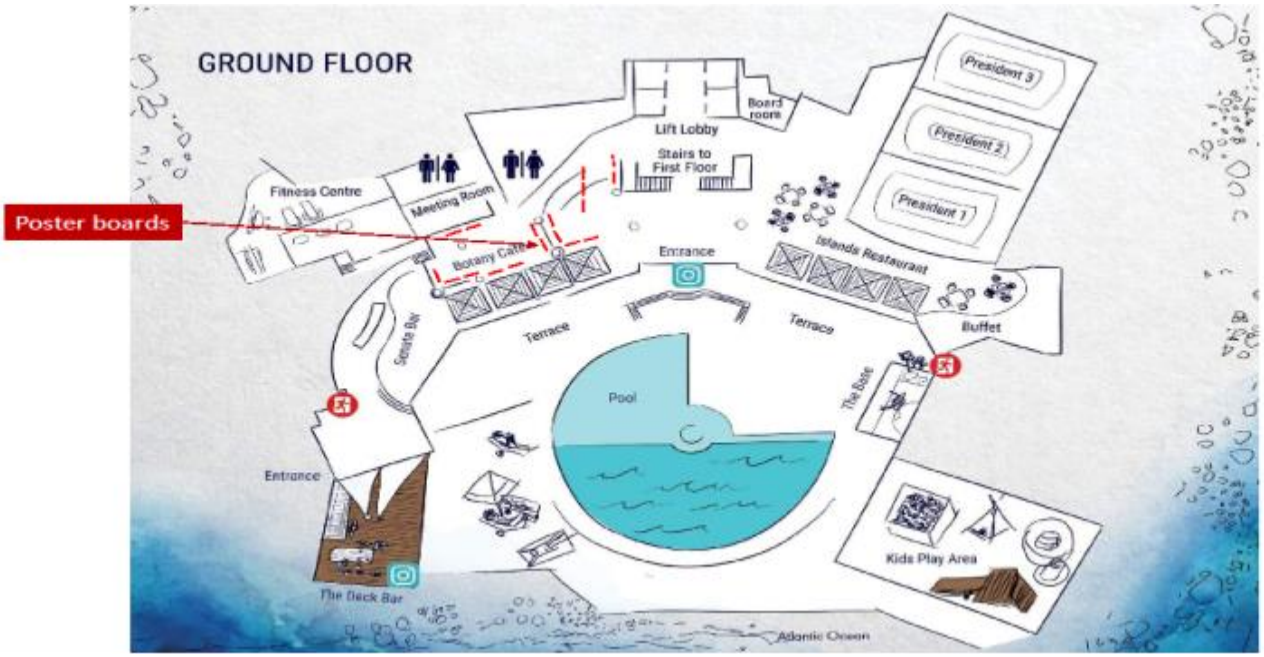
On behalf of the entire Planning Committee and with thanks to our generous sponsors, we welcome you and look forward to your attendance and active participation.

Sincerely,

George Patrinos and Ambroise Wonkam
Co-Chairs, G2MC 4th International Meeting Planning Committee

Hotel Logistics

Located in Bantry Bay between the vibrant city and the Atlantic Ocean, the President Hotel welcomes you to Cape Town and all its breathtaking sights, thrilling activities and inspiring moments.
Sophisticated luxury and personal service come standard, while local style, authentic artwork and innovative design set us apart as the most-loved destination hotel in the Mother City.
Relax in our light, bright and spacious rooms and apartments, there's plenty of room to make yourself at home.
Add to that an array of luxury facilities, smart technology and stylish design – and you'll never want to leave!
Our family-friendly accommodation, offerings and experiences means hassle-free and fun holidays for the whole family.
Our conference venues boast state-of-the-art infrastructure and our Wi-Fi offering is the fastest of any hotel in SA.
Spend sun-kissed days without a breath of wind beside the infinity pool. Savour delicious locally inspired cuisine, gourmet pizzas and more at our restaurant, café and bars.
Explore the beaches, mountain, shopping and outdoor adventures just moments away.
It's all you love about Cape Town and more.



Directions from Cape Town International Airport to President Hotel

Cape Town International Airport
Matroosfontein, Cape Town, 7490, South Africa

Take Airport Ring Rd and Airport Approach Rd to Settlers Way/N2 in Kanana
7 min (4.0 km)

Continue on N2 to Cape Town City Centre
13 min (16.4 km)

Follow M6 to Alexander Rd in Sea Point
11 min (5.7 km)
President Hotel
4 Alexander Rd, Bantry Bay, Cape Town, 8001, South Africa
These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Ground Transportation

The President Hotel does not provide shuttle service to and from the airport but it is suggested that attendees use this service:

My Shuttle
Contact person: Joshua Obery
Mobile: + 27 60 919 0401 (including after hours)
Email: service@myshuttle.co.za
Website: www.myshuttle.co.za
Prices:
R380 per person one way (R50 for every additional person)
Group rates:
Group 1: 4-6 Passengers - R650
Group 2: 7-9 Passengers - R750
Group 3: 10-15 Passengers - R1 200

Taxi
For safety and security, arriving passengers should only use Touch -Down Taxis, the officially authorized airport taxi service provider on 083 652 0786 or 082 569 7555.

Directions to the Gold Restaurant from President Hotel

President Hotel
4 Alexander Rd, Bantry Bay, Cape Town, 8001, South Africa

Take Alexander Rd to Beach Rd/M6
58 s (230 m)

Continue on M6 to Green Point
9 min (4.8 km)

Continue on Ebenezer Rd. Take Prestwich St to Bennett St in De Waterkant
1 min (290 m)

GOLD Restaurant
15 Bennett St, Green Point, Cape Town, 8005, South Africa

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Precision Medicine
Centre for the Fourth Industrial Revolution

Leapfrogging with Precision Medicine

Delivering the policies and frameworks needed to accelerate a precision medicine-ready health system

The Challenge

Advancing precision medicine in an equitable and societally beneficial way means ensuring that healthcare systems are able to adopt the most scientifically and technologically appropriate approaches to a more targeted and personalized way of diagnosing and treating disease. In certain instances, countries or institutions may be able to bypass, or "leapfrog", legacy systems or approaches that prevail, particularly in developed country contexts.

The World Economic Forum's **Leapfrogging with Precision Medicine** project, led from its Centre for the Fourth Industrial Revolution, will develop a set of case studies demonstrating how a precision medicine approach in countries with greenfield policy spaces can potentially transform healthcare delivery and outcomes. Through this, approaches to enacting precision medicine-ready policies and governance mechanisms will be explored, identified, iterated and scaled.

The Opportunity

Participating in this project will clarify foundational elements necessary to develop a precision medicine-ready healthcare system in a developing or emerging economy, and the necessary policies to support the development and sustainability of these elements. This will be done with different pilots in a number of countries.

Rwanda
The first potential pilot project will develop a case study on diagnostic capacity building for cancer treatment in Rwanda. This is designed to address the policy barriers and gaps around accelerating a precision medicine approach.

Diagnostics function as a compass for precision medicine. With the support of appropriate policies and governance mechanisms, countries can innovatively address limited diagnostic equipment, laboratory facilities and human capacity that contribute to delayed cancer diagnoses. Such diagnostic tools could include biomarker testing in instances (e.g. for breast cancer) where this could help guide providers to certain treatment pathways. Genetic and biological information generated through diagnostics helps ensure early and accurate treatment, thereby avoiding incorrect treatments, wasted time and unnecessary costs.

Additional impacts from leapfrogging to appropriate cancer diagnostics could be the development of laboratory networks, biobanks and genomic sequence databanks, and research and development of treatments better matched to the unique genomic features of the Rwandan population.

China
The second potential pilot project will use a case study in China, which has different resources, infrastructure and barriers than Rwanda regarding precision medicine readiness.

Under the Healthy China 2030 Initiative, China is in a leadership position for precision medicine development globally, in terms of the speed and scale in which the concept can be advanced through the country's healthcare systems. There is a solid foundation from which to leapfrog due to the China's strong scientific research, large populations for clinical trials, good support for industry and venture capital, and pilot cities for innovation. The success of precision medicine in China will depend on how well the country addresses issues of data safety and sharing, development of local

technologies and resources, talent management and development of industry standards.

While this project is in very early scoping stages, a potential option that has emerged for increased exploration, informed by these factors and the recent government updates of clinical trial regulations and approvals of precision medicine therapies, is revisioning clinical trials in the context of precision medicine.

Impact

The Leapfrogging with Precision Medicine project will enable the testing of scalable policy mechanisms to support design, implementation and evaluation of precision medicine approaches in developing countries, or emerging economies.

Enabling a precision medicine approach in such contexts, potentially by leapfrogging existing or prevailing practices, means that vastly more patients will have access to personalized treatments designed to improve outcomes, and streamline and reduce costs.

Anticipated impacts for government, society and industry of the leapfrogging project are to:

- Test, refine and scale policies and frameworks that support building the fundamental components of a precision medicine-ready healthcare system
- Provide a "sandbox" for experts and practitioners grappling with best models of addressing ethical, legal, social issues related to access to cutting-edge or most appropriate precision medicine approaches in developing countries and emerging economies
- Explore whether one focus area (e.g. diagnostic capacity, clinical trials) can function as a first mover in transitioning to a precision medicine-ready system
- Innovate how to incorporate user/patient-centred design principles into precision medicine-ready systems in developing countries or emerging economies
- Gain a community of partners and stakeholders with which to share best practices and potentially collaborate on approaches to leapfrog to solutions for more targeted and personalized screening, diagnosis and treatment of diseases
- Evaluate how leapfrogging can lead to more efficient and effective approaches to improving health outcomes in low-to-medium resource countries versus the status quo

Next Steps

Summer 2018
- Finalize the Rwanda pilot project scope, designate point of contact in Rwanda, and establish an advisory board and core working group of partners
- Hold China Business Roundtable on Precision Medicine

Fall 2018
- Develop the Rwanda pilot project's governance structure, objectives and timelines
- Start the China pilot project scoping process

Fall–Winter 2018
- Surface and refine policy barriers and gaps, identify testable solutions and develop an implementation and evaluation process for the Rwanda pilot project
- Develop and approve the China leapfrogging concept note

Spring–Winter 2019
- Pilot the Rwanda project with project partner institutions
- Finalize the China pilot project's scope, and establish an advisory board and core working group of partners

Spring–Winter 2020
- Refine the Rwanda pilot project policy frameworks and scale outputs with other healthcare systems
- Pilot the China project with project partner institutions

Key Dates

- *19 September 2018:* Private session on precision medicine at the Annual Meeting of the New Champions, Tianjin, People's Republic of China
- *21-22 September 2018:* Precision Medicine and Policy Summit, Beijing, People's Republic of China

How to Engage

Project community: Nominate experts, policy-makers, or senior executives to help guide individual Centre for the Fourth Industrial Revolution projects by providing regular input as projects develop.

Project Fellow: Nominate an individual from your company to work full- or part-time at the centre to play an integral role in shaping this initiative.

Contact

For more information, contact Genya Dana, Precision Medicine Project Head (Genya.Dana@weforum.org); Elissa Prichep, Project Lead, Rwanda pilot (Elissa.Prichep@weforum.org); or Wen Mao, Project Lead, China pilot (Wen.Mao@weforum.org).

Science cities: The cape of change

Africa's science star is confronting its colonial past to set a more inclusive research scene, benefitting more of its citizens.

1 November 2018

Linda Nordling

Nature Picture Library/Alamy

Cape Town benefits from geographic advantage and funding strength.

Early pastoralists living on Africa's southern tip found fresh water and grazing in the shadow of Table Mountain, where Cape Town lies today. They called it *Camissa*, the place of sweet water. European explorers rounding the Cape, too, found it a useful pit stop. In their wake, botanists came to study the region's unique plants and animals, and astronomers came for the view it offered of the southern skies.

Today, Cape Town is a global hub for scientists studying biological diversity and astronomy. The city houses the nerve centre for an enormous radio telescope being constructed hundreds of kilometres inland, set to become the most powerful in the world. It is also home to several experts on local species ranging from the penguins that nest on its beaches, to the *fynbos* shrubland unique to the area.

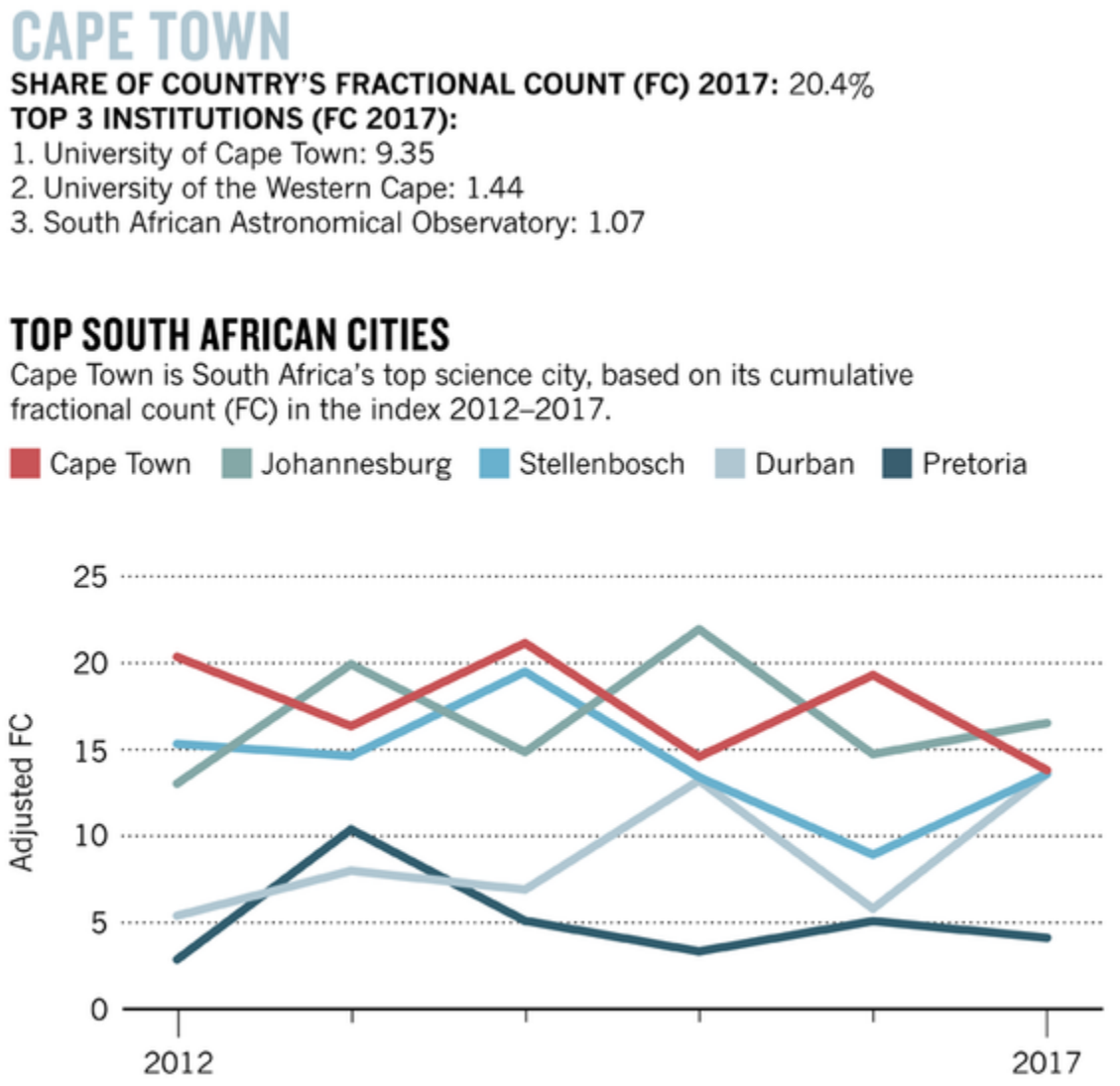
But in the years since **South Africa's** first democratic elections in 1994, this scientific legacy, rooted in colonialism and racial segregation, has become a double-edged sword. Cape Town's top science institutions face pressure to shed their white and male-dominated past for a more diverse future. This means making room for more black and female staff and students, but also doing research that addresses South Africa's palpable poverty.

Southern skies

Cape Town is Africa's leading science city, when measured on its contribution to articles in the 82 high-quality science journals in the Nature Index over the past six years. Its accumulated fractional count (FC) for 2012–2017 was 107.2, just above the score for Johannesburg (102.77). The city's output is largely in the physical sciences, with strong representation in the life sciences and Earth and environmental sciences.

The **University of Cape Town** (UCT), South Africa's oldest, is by far its leading institution in the index with a 2012–2017 FC of 33.96, followed by the **University of the Western Cape** (UWC) at 5.08. Nearby Stellenbosch — the

third highest performing science city in Africa with a six-year FC of 86.84 — also contributes to the Cape's research appeal.



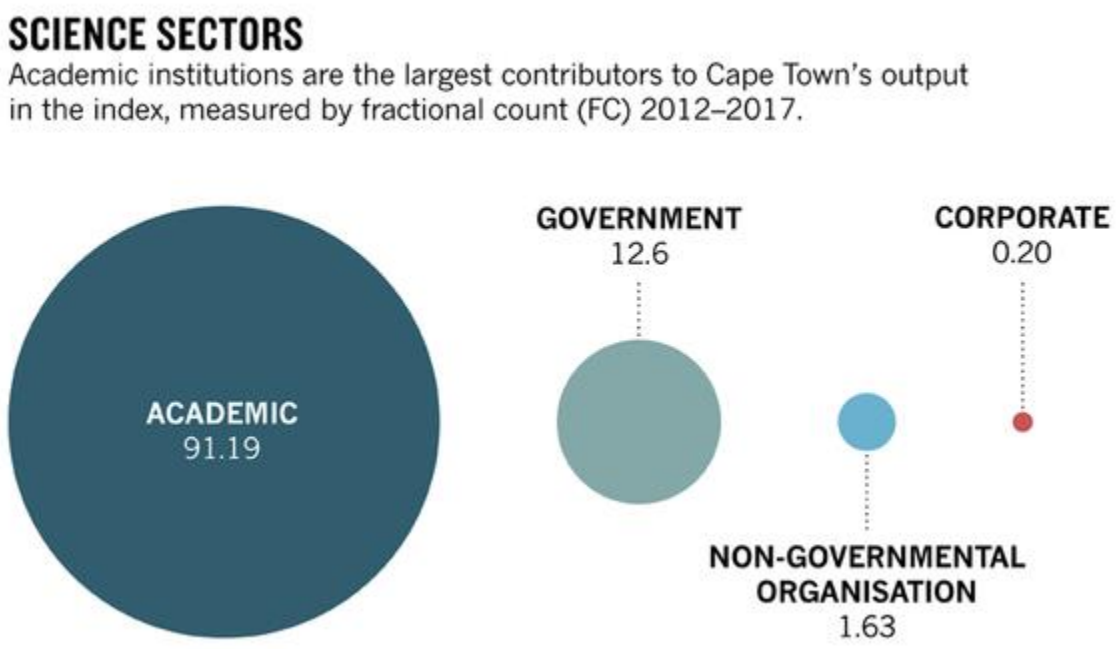
Source: Nature Index

Cape Town attracts significant research investment. Universities in the Western Cape, the province of both Cape Town and Stellenbosch, were responsible for nearly 31.8% of South Africa's higher-education research spend in 2015. By contrast, universities in Gauteng — the province of the capital Pretoria and Johannesburg, which has twice as many inhabitants as the Western Cape — were responsible for 33.5% of the spend. In South Africa's central Karoo desert, an international team is building the **Square Kilometre Array**, a radio telescope whose thousands of dishes will be shared by **Australia** and Africa.

The telescope has attracted hundreds of scientists and engineers to the city. UCT and UWC are both partners in the African Research Cloud, a national project to develop the capacity needed to deal with the huge datasets this telescope will produce. And in 2016, South Africa's **Council for Scientific and Industrial Research** launched Africa's fastest supercomputer at its Cape Town-based **Centre for High Performance Computing**, which will also play a role in designing the data-crunching systems for the astronomy data.

The supercomputer, known as Tsessebe, or 'antelope', is also supporting Cape Town's claim as a bioinformatics hotspot. Africans are the most genetically diverse people in the world. Humans have lived on the continent longer than anywhere else; only a subset migrated out. There is a push to understand how this genetic diversity influences disease and healthcare. The **South African Medical Research Council** has partnered with **China** to build the continent's most powerful whole-genome sequencing facility in the city, due to open in late 2018.

The region's biodiversity, accessible so close to a major urban centre, continues to spark scientists' imagination — not least because it provides test-cases for species under increasing environmental and climatic stress.



Source: Nature Index

"We live in the urban area with the highest concentration of red-listed species in the world," says Claire Spottiswoode, who heads UCT's **Percy FitzPatrick Institute of African Ornithology**. A South African by birth, she recently returned to Cape Town after 15 years abroad. "It's a privilege to have fascinating research problems and exhilarating biodiversity in such close proximity," she says. But change is afoot for South Africa's established institutions. UCT is a case in point. From its mountain perch, on land bequeathed by the staunch imperialist, Cecil John Rhodes, UCT looks out over the Cape's lowlands. It was to these Cape Flats, which bake in summer and flood in winter, that the architects of Apartheid forcefully moved non-white families. Its residents remain predominantly black and poor.

Decolonizing science

In the early years of democracy, despite efforts to make them more inclusive, the intake at South Africa's top universities remained skewed towards relatively wealthy and advantaged students. However, three years ago, a rally to remove a statue of Rhodes from UCT snowballed into a country-wide push for free, decolonized education. Colonialism, the protesters argued, remained woven into the fabric of South Africa's institutions of higher learning. The protests disrupted teaching and damaged property in the Cape region worth more than 130 million rand (US$9 million).

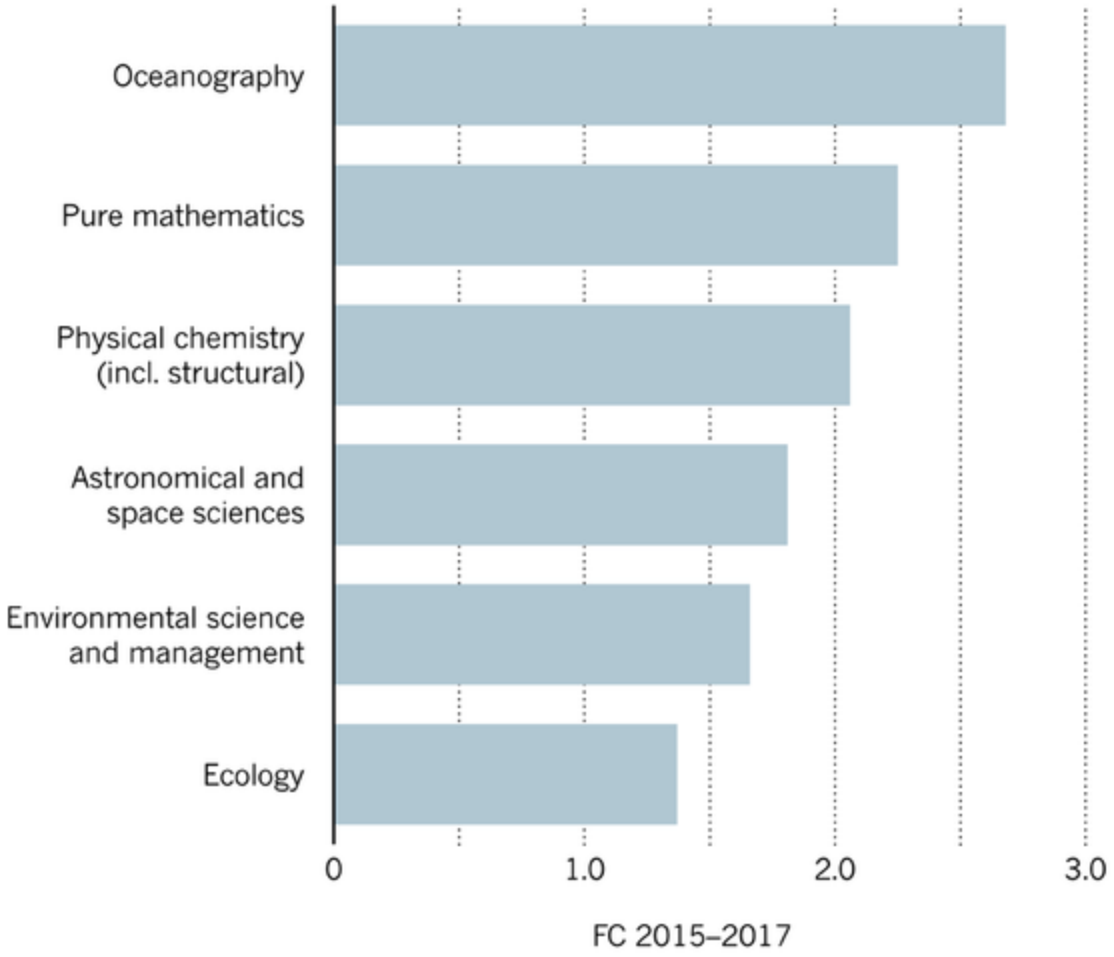
Mamokgethi Phakeng, a mathematics education professor and UCT's vice-chancellor, is working to promote black excellence at the institution, where white South African professors still outnumbered their black, Indian and mixed-race South African counterparts by a factor of nearly four to one in 2017.

Susan Bourne, UCT's dean of science, says the university rewards community-facing initiatives such as outreach projects, spin-out activities or giving policy advice more now than it did a decade ago.

She offers the Abalobi app as an example of research developed at UCT that is directly helping local communities. The app connects small-scale fishers with restaurants, helping to match supply with demand and allowing fisheries to trace the catch from hook to cook.

TOP FIELDS

Below are the top 6 fields that researchers in Cape Town contribute to in the index, measured by fractional count (FC) 2015–2017.

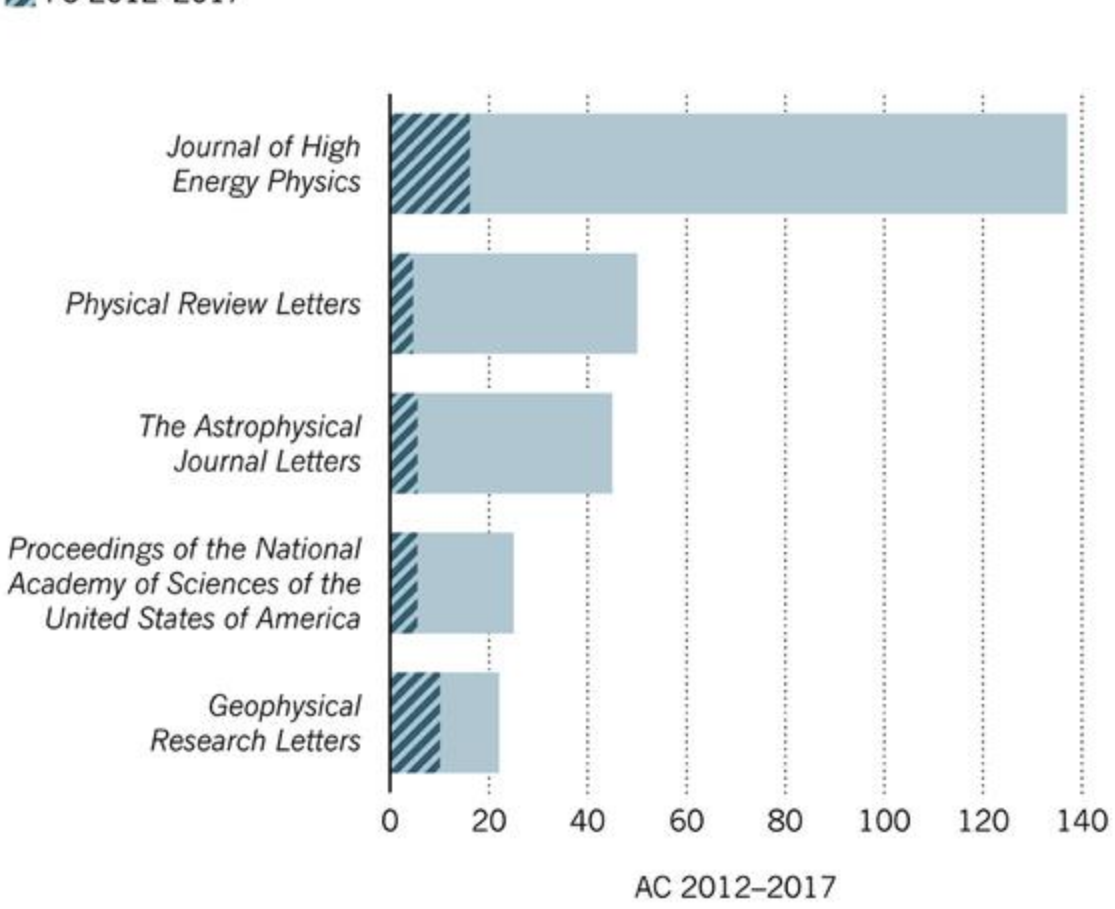


Source: Nature Index/Dimensions from Digital Science

Another way to bring scientists and city-dwellers closer together is through cooperating on urgent problems, Bourne adds. One example is the devastating drought that gripped the city earlier this year. The crisis allowed UCT to demonstrate the real-world usefulness of its science. Its water experts offered basic water-saving advice to the public, and policy input to disaster-response agencies, in particular through the UCT Future Water Institute, helping to keep the ‘sweet waters’ flowing in Cape Town.

CHOICE JOURNALS

Cape Town-based researchers contribute more articles (AC) to the *Journal of High Energy Physics* than to any other index journal. In this journal, they account for 12% of the authorship (FC) of papers to which they contribute.



Source: Nature Index

The South African government also wants to put science to work to address the country's ills. A 10 September 2018 draft science policy — the country's first for 20 years — identifies fostering science and innovation for social benefit and economic transformation as a key priority for the country.

But, Bourne admits UCT needs to do more. "We haven't broken through from being the place up on the hill that people on the Cape Flats think doesn't belong to them."