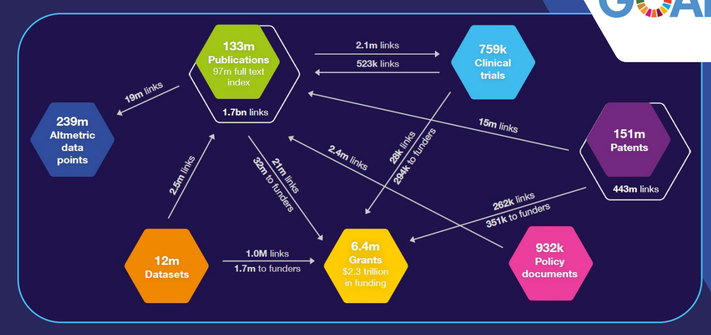
# Unveiling SDG Impact Along the Research Lifecycle: A South African University Perspective

The countdown to achieving the UN Sustainable Development Goals (SDG) is underway, with less than seven years remaining. Against this backdrop, public and private funders are increasingly demanding evidence of societal impact stemming from the grants they award. However, many institutional systems currently lack the data and capacity to effectively detect and report such impact - especially through an SDG lens.

This is where **Digital Science** and its **Dimensions** provision can help, presenting an interconnected suite of tools for research discovery, evaluation, and funder reporting at both research output and grant level (figure 1). The SDG classification [1] approach within the Dimensions dataset allows us to break down key measures, whilst aligning them with the UN Sustainable Development Goals.

Through this poster, we invite you to join us in a transformative journey through a vast data landscape encompassing over $2trillion of global grant funding, 130 million publications, global policy literature and an astounding 250 million online mentions of research. Our journey will look at the South African research landscape, focusing on research from South Africa.

Figure 1: Dimensions interlinked data




## The problem:

Imagine a world where a university's progress towards the UN Sustainable Development Goals is not just rhetoric but backed by concrete evidence. The Dimensions dataset, rich in research publications, funding sources, and collaborators, enables us to precisely measure and showcase a University's contribution to the SDGs through its research impact.

It has been acknowledged that in the past, there has been untapped potential to elevate the visibility of research from Sub-Saharan regions such as South African on a global scale [2]. By harnessing and analysing the interconnected web of data, however, we can unravel the impact stories hidden within.

The Dimensions data demonstrates the strong growth in SDG research within South Africa, particularly from the implementation of the UN SDG agenda in 2016 (figure 2).

In addition to the quantity of research from South Africa, good quality research has shown consistent growth (figure 3), demonstrating the exceptional calibre of SDG research being conducted*.

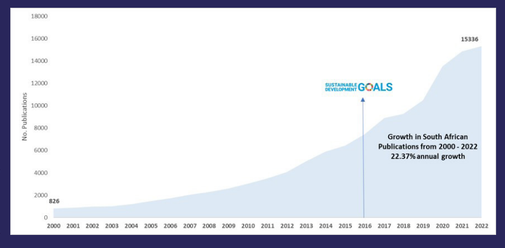



Figure 2: The growth of SDG classified research in South Africa

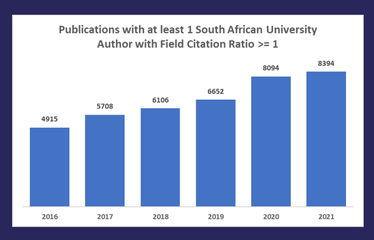



Figure 3: The growth of SDG classified research in South Africa with an average or high FCR* (measure of scientific influence)

This is all well and good, but what about the **impact** that this research is having?

## The Impact Paradox - Evidence for Research Assessment:

Research impact, the heartbeat of universities' missions, poses a paradox: What is it and how can we quantify and evidence it? Fortunately, the interlinked data within the Dimensions dataset holds the key. Connectivity within the data establishes a vital link between grants awarded to South African universities through to their resulting publications, collaboration and citation networks.

Firstly, let's look at the distribution of research in South Africa through an SDG lens. We note (figure 4) that despite some fluctuation, the top funded SDG research topics in South Africa include SDG3 Good Health & Well-being, SDG4 Quality Education and Peace and SDG16 Justice and Strong Institutions.

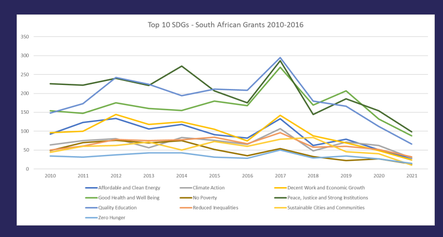



Figure 4 SDG Classified Grants, South Africa 2010 - 2022

Further analysis on this research output unveils some interesting trends. Focusing on research output from when the UN SDGs were introduced (2016) we note that SDG13 Climate Action and SDG7 Affordable and Clean Energy have the highest share of citations at 15% and 18% respectively.

This indicates that these inter-related topics are highly researched and discussed within the academic community. Please note that the figures for SDG3 (Good Health and Well-Being) have been excluded from the analysis below due to their significantly higher values compared to other SDGs. This exclusion aims to maintain a balanced perspective and focus on the research output and impact of other SDGs, as the substantial volume of data for SDG3 could potentially overshadow the insights derived from the rest of the dataset.

SDG4 Quality Education has the highest share of publications at 16% (figure 6) and one of the higher shares of SDG classified grants within the Dimensions database (at 20%). The citation share however is half that of SDG7 Affordable and Clean Energy. The data suggests that there is a strong focus on research related to improving the quality of education, however, there appears to be less academic or research interest in this particular area as this research has been cited less frequently.

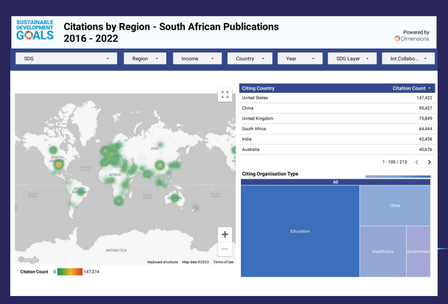



Figure 5 Looker Dashboard created through Dimensions GBQ offering. SDG Classified Publication & Citation Distribution, South Africa 2010 - 2022


Figure 6 SDG Classified Publication & Citation Share, South Africa 2016 - 2022

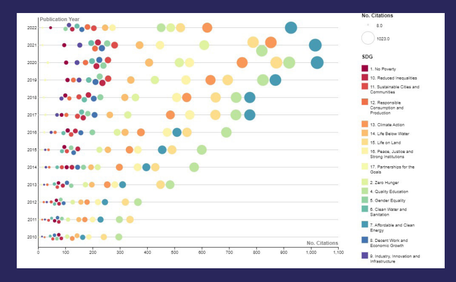



Figure 7 SDG Classified PublicationCitation Trends, South Africa 2016 - 2022

In addition to analysing research output and citations, it is also valuable to consider the policy impact and influence of the research conducted within the context of the SDGs.

Research informs evidence-based policymaking, enabling governments and organisations to make informed decisions and implement effective strategies to tackle societal issues and promote sustainable development.

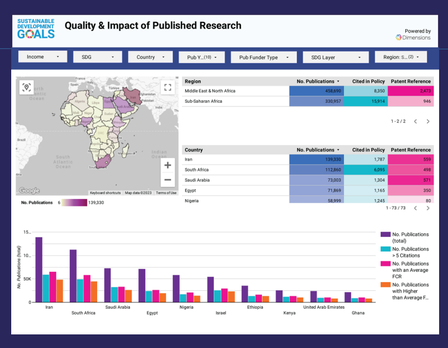



Figure 8 Looker Dashboard created through Dimensions GBQ offering. SDG Classified Publication & Policy / Patent Citation Counts, SSA & MENA Regions 2010 - 2022

We can discover evidence of research reuse within influential global policy and think tanks. We can uncover the impact of South African research through citations within patent literature, highlighting its relevance beyond academia.

The Dimensions dataset (figure 8) showcases the robustness of research conducted in South Africa, particularly within the Sub-Saharan Africa (SSA) and Middle East and North Africa (MENA) regions, as evidenced by a significant number of patent references and policy citations. Notably, South Africa emerges as the second-highest ranking country in terms of both research output and quality within these regions. Further analysis can unveil the areas of research and the top researchers and Universities that lie behind these policies and patent citations.

## Impact Through the Power of Collaboration:

Citations do not capture the full impact or relevance of a research paper, as they primarily reflect its influence within the academic community

Collaboration serves as a catalyst for innovation and progress. By delving into the multifaceted dimensions of the dataset, we have the opportunity to identify and shed light on promising research areas, investigate funding patterns, and uncover emerging trends. Moreover, we can navigate the intricate network of potential collaborators, fostering strategic alliances with institutions that share similar goals and values. Envision a world where data-driven insights empower universities to accelerate discoveries and maximise the impact of their research endeavours.

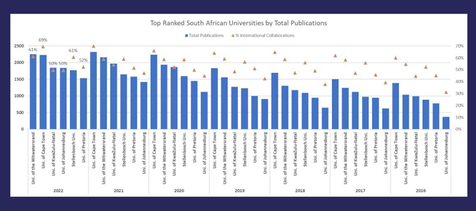



Figure 9 Top ranked Universities in South Africa (by Research Output) with International Collaboration detail

In addition to exploring University performance in terms of research output, the interlinked data allows further analysis on the levels of international collaboration over time (figure 9)

Academic collaborations with low and low-middle income countries hold substantial value as impactful endeavours. It fosters knowledge exchange, capacity-building, and culturally sensitive research, empowering local researchers, enhancing research capabilities, and addressing critical issues specific to these countries, ultimately promoting equity, inclusivity, and reducing global research disparities.

South African researchers demonstrate a commendable track record of collaboration with lower income countries, as evidenced by the fact that over 57% of research pertaining to the Zero Hunger Sustainable Development Goal (SDG) with at least 1 author from South Africa involves partnerships and collaborations with countries of lower income status.

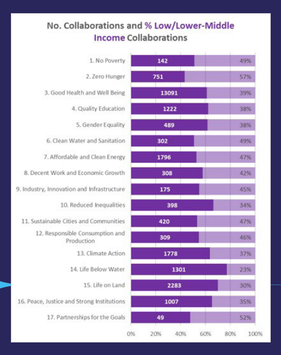



Figure 10 South African Collaboration with Low and Lower-Middle Income Countries

## Benchmarking and Championing Research Excellence - Alternative Impact Measures:

Emerging research communities face some unique challenges, however, these regions clearly have their own strengths, and priorities. A brief analysis of SDG research in a select group of countries exemplifies the presence of excellent research practices in countries in earlier stages of academic research growth that more established research communities can learn from. Kenya and South Africa demonstrate outstanding practices in areas such as open science, transparency and reproducibility. This is made clear through analysis of the Dimensions Research Integrity Dataset - which acts as a metric that highlights good practices in scientific communication. The data set records whether research outputs have ethical approval statements, data availability statements, author contribution statements, and other hallmarks of reproducibility and transparency. We refer to these features of high-integrity scientific reporting as Trust Markers.

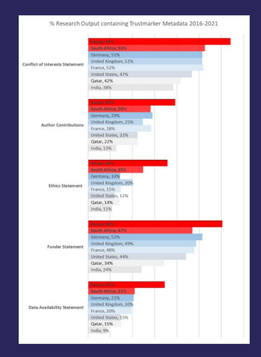



Figure 12 Dimensions Research Integrity Trust Marker distribution in a selection of research active countries.

## To Conclude:

The Dimensions dataset provides a comprehensive view of research impact along the research lifecycle, enabling South African universities to precisely measure and showcase their contribution to the UN Sustainable Development Goals (SDGs). The dataset reveals the strong growth and quality of SDG research in South Africa, with notable focus on topics such as Affordable Energy.

It is important to recognize that research impact should not be solely assessed through citations, as various factors and dimensions contribute to the overall impact. The data emphasises the significance of international collaborations, particularly with lower income countries, in fostering knowledge exchange, capacity-building, and addressing critical issues specific to these regions. By leveraging the interconnected dataset, universities can benchmark research excellence, identify emerging trends, and strategically plan for impactful research. It is essential to consider multiple measures and dimensions of research impact to fully comprehend its multifaceted nature and drive progress towards achieving the SDGs.

[1] Science, Digital; Wastl, Juergen; Porter, Simon; Draux, Hélène; Fane, Briony; Hook, Daniel (2020): Contextualizing Sustainable Development Research. Digital Science. Report. https://doi.org/10.6084/m9.figshare.12200081.v2

[2] JOUBERT, Marina and GUENTHER, Lars. In the footsteps of Einstein, Sagan and Barnard: Identifying South Africa's most visible scientists. S. Afr. j. sci. [online]. 2017, vol.113, n.11-12 [cited 2023-05-22], pp.1-9. http://dx.doi.org/10.17159/sajs.2017/20170033.

*Footnote: The Field Citation Ratio (FCR) is a citation-based measure of scientific influence of one or more articles. It is calculated by dividing the number of citations a paper has received by the average number received by documents published in the same year and in the same Fields of Research (FoR) category

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