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The Interface between Research and Policy-Making in South Africa

Exploring the institutional framework and practice of an uneasy relationship

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Abbreviations

ACCESS	Applied Centre for Climate & Earth Systems Science
AgBiz	Agricultural Business Chamber
ANC	African National Congress
ASSAf	Academy of Science of South Africa
BEE	Black Economic Empowerment
BMBF	Bundesministerium für Bildung und Forschung / German Federal Ministry of Education and Research
BRICS	Group formed by Brazil, Russia, India, China and South Africa
CHEC	Cape Higher Education Consortium
CREST	Centre for Research on Evaluation, Science and Technology
CSIR	Council for Scientific and Industrial Research
DAAD	Deutscher Akademischer Austauschdienst / German Academic Exchange Service
DBSA	Development Bank of Southern Africa
DEA	Department of Environmental Affairs
DFG	Deutsche Forschungsgemeinschaft / German Research Foundation
DLRP	Projektträger des Deutschen Zentrums für Luft- und Raumfahrttechnik (Project Management Agency of the German Aerospace Centre)
DNAE	DNA Economics
DPSA	Department of Public Service and Administration
DST	Department of Science and Technology
DTI	Department of Trade and Industry
EWT	Endangered Wildlife Trust
FES	Friedrich Ebert Stiftung/Foundation
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HBS	Heinrich Böll Stiftung/Foundation
HSRC	Human Sciences Research Council
IDRC	Canadian International Development Research Centre
IERI	Institute for Economic Research on Innovation
IGD	Institute for Global Dialogue
ISS	Institute for Security Studies
KAS	Konrad Adenauer Stiftung/Foundation
n.d.	No date
NGO	Non-Governmental Organisation

NRF	National Research Foundation
NT	National Treasury
NWU	North-West University
ODI	Overseas Development Institute
RA	Research Africa
SAIIA	South African Institute of International Affairs
SANBI	South African National Biodiversity Institute
SDGs	Sustainable Development Goals
SUN	Stellenbosch University
TIPS	Trade & Industrial Policy Strategies
ToR	Terms of Reference
TRALAC	Trade Law Centre
Tutwa	Tutwa Consulting Group
UCT	University of Cape Town
UJ	University of Johannesburg
UN	United Nations
UP	University of Pretoria
Wits	University of the Witwatersrand
WWF	World Wide Fund for Nature

Executive summary

The interface between research and policy-making is gaining relevance, as global challenges and their complexities increase. Policy-makers worldwide discuss and need to address complex common global challenges such as climate change, peace and security or human food security. The complexity of the task requires at least two things. First, sound research-based evidence for informed decisions needs to be available, ideally based on evidence related to the local context. Secondly, this evidence should be accessible to decision-makers, which, in democratic societies, includes an interested public. In this context, "accessibility" stands for the need to summarise and translate complex data, and present research results in short, concise and implementable policy recommendations for decision-makers with limited time resources. The channels of communication can be either through the public media or through direct interactions between researchers and policy-makers.

The aim of this paper is to analyse the framework for the interaction between research and policy-making, first discussing literature on the often-uneasy relationship, and secondly exploring generic and context-specific tensions in South Africa. In other words, it explores the extent to which the South African science-policy system facilitates or hinders research-based policy advice. This exploration starts with the policy institutions that shape science and academic research. Inter-institutional relations between government and research institutions, as well as funding and other, non-monetary incentive structures, are portrayed in order to assess their strengths and weaknesses. This analysis serves as a basis for explaining the existing tensions in the South African research and policy system.

This research is empirically based on more than 100 interviews and background discussions conducted between February and April 2017 with South African and German actors, comprising university scholars from different universities and academic disciplines, researchers from think tanks, Non-Governmental Organisations (NGOs) and government agencies, consultants, international actors and policy-makers. "Policy-makers" here entails government officials working on different levels of government hierarchy (from director level upwards).

The interface between policy and research is always tension-ridden for a number of reasons, including, among other thing, divergent rationales, different time-horizons and subsequently disappointed mutual expectations. Some tensions in the relationship between researchers and decision-makers are generic; some emanate from the specific context in which the interface between researchers and decision-makers is organised. Amongst the main tensions in the modern-day South African science and policy system, with impacts on the science–policy interface, are:

- The structural under-funding of research in South Africa
- Lack of incentives for applicable and policy-oriented research publications
- Shortcomings in the education system, which does not provide students with the skills needed to successfully attend university and/or to participate in the labour market
- Historically deep-rooted mistrust between population groups and between generations

- Mismatched expectations of the research–policy interface that are unlikely to be fulfilled and which are caused by the divergent rationales and roles that researchers and policy-makers are confronted with
- Severe time constraints, which means, on the research side, lack of time for conducting profound research and, on the policy side, lack of time for reading academic documents
- Irregular, ambiguous, and sometimes disrespectful communication by researchers and policy makers, using language that is not always appropriate for the intended target audience.

In order to address these tensions, the authors of this paper collected ideas from their interview partners in South Africa. These ideas were assessed and developed further by the research team, sometimes by merging or expanding ideas. The following **recommendations** are considered to be the most relevant to South African actors at the interface between research and policy-making:

1. *Government needs to increase expenditures for research and development to the same level as in other middle-income and BRICS countries.* This seems a pre-condition for more, and particularly more targeted, research on topics that can help South Africa's sustainable, equitable and holistic growth and development, either directly (e.g. through trade and investment strategies) or indirectly (e.g. in biodiversity conservation plans).

2. *Government officials and researchers need to engage in co-creation of research* to reduce uncertainties and mismatched expectations. There needs to be regular and open communication of all sides involved throughout the entire duration of a project. Already, in the design of commissioned studies and other common projects where both researchers and policy-makers are involved, the stakeholders need jointly to select the focus areas of the project or study. This implies a co-production of the terms of reference (ToR). Stakeholders need the opportunity to express their expectations of the project, as well as to frame any questions, concerns and feedback to the other parties.

3. *Research institutions need to offer training for researchers and policy-makers.* Researchers could be specifically trained and guided on how to produce policy-relevant outputs, such as policy briefs, and at which point in time these inputs are usually requested. This in turn might help to improve the timing of research inputs. Policy-makers could intensify and expand their expertise by attending training on particular scientific contents related to their area of work. Additionally, policy-makers could participate in short trainings on the use of scientific evidence.

4. *Research institutions should incentivise network creation for junior researchers* in order to help address the inter-generational mistrust and foster crucial personal networks and contacts. The creation of exchange forums and secondments for young professionals and internships for students in government departments are an option for the next generation of researchers to gain practical insights into political processes and thus improve communication.

5. *Government and research institutions should strengthen "knowledge broker" positions.* These could be specialised positions in government departments, agencies, think tanks

and/or universities explicitly targeted at translating, communicating and mediating between the different stakeholders in the policy advice process. Alternatively, and presumably more promising, would be incentives for both researchers and decision-makers to include the task of engaging in the science–policy interface in their respective performance assessments. This encompasses incentives for researchers to produce policy-oriented outputs for which they are professionally rewarded, e.g. through an increase in the rating of the National Research Foundation (NRF).

The 2030 Agenda, and especially Sustainable Development Goal (SDG) 17 on global partnership and cooperation, asks for eye-level engagement, and emphasises the importance of mutual exchanges. Consequently, the above recommendations also include relevant points for **international partners** in the research cooperation – be they science ministries or their agencies:

1. *Development and science administrations should systematically regard science cooperation as new forms of cooperation.* Cooperation between actors requires a shared understanding of the challenge to be addressed. Intensified science cooperation is an avenue to replace traditional development cooperation beyond "graduation" from development assistance. It does, however, need dedicated and coordinated funding from both sides of the administration.

2. *Science administrations should include policy-relevance as a criterion for funding.* Currently, the criteria include "applicability", which would need to be defined more broadly in order to better incentivise the interface between research and policy-making.

3. *Development and science administrations should further foster network creation, not least amongst next-generation researchers.* This could build on existing efforts, e.g. in graduate promotion programmes funded by external actors such as the DAAD (Deutscher Akademischer Austauschdienst/ German Academic Exchange Service) or programmes of the Alexander-von-Humboldt Foundation.

These recommendations and suggestions should serve as stimuli for a discussion around possible starting points for South African as well as international actors who want to strengthen the already existing science–policy interface in South Africa.

1 Introduction

Science and policy(-making) should be an excellent match. Science is the systematic study of nature and behaviour, which aims to identify the nature or principles of the subject under scrutiny. Policy, for its part, describes a set of ideas or plans used as a basis for making decisions. Thus, research (the act of studying systematically) should be a much-sought-after support to policy-making, as researchers provide evidence on which decisions can be based. Yet, the relationship is not that simple. It sometimes entails conflicting roles, and comes with inherent tensions, depending on the setting in which researchers and policy-makers engage with each other. This paper explores the research–policy interface in South Africa.

The fundamental and interlinked challenges captured by the 2030 Agenda for Sustainable Development have increased more than ever the need for research and for the generation of sound evidence. Complex challenges with varying, and locally often contradictory, developments need to be explored, monitored and forecast, and policy-makers are expecting input for their decisions so that these decisions are based on more than a mere thumb-suck. Not least, the "great societal questions" ("große gesellschaftliche Herausforderungen", Wissenschaftsrat 2015) – the changing climate and exponential increase of technological innovation – require efforts in research, investments in the research system, and efforts to transcend boundaries, both between countries and between disciplines. Yet, even at a seemingly more parochial, more hands-on level, effects of policies need to be explored as much as possible, and require almost constant research, so that the most effective decision is taken. (Note that "effective" here could be "cost effective", "most targeted" or with the widest possible range of beneficiaries.)

This is one side of the coin. Another, more pessimistic, reading is that scientific or research-based evidence has come under pressure as a basis for decision-making in the political sphere.[1] Increasing complexities and uncertainties in research results are difficult to navigate and more difficult for the research community and policy-makers to communicate. Populist movements ignore the complexities of evidence in a number of areas, and currently gain votes through campaigns that have no substantial discussion about evidence or its interpretation. Evidence-informed policy-making has come under increasing pressure at a time when technology allows for the processing (and manipulation) of an increasing amount of data, and the reception of evidence is filtered by "beliefs" rather than the quality of the underlying data. Probably the starkest examples of political actions beyond evidence in recent years was the questioning of human influence on climate change and the subsequent withdrawal of the USA from the Paris Agreement by the Trump administration.

The aim of this paper is, first and foremost, an exploration of the national setting. Research systems are shaped by national histories and institutions, despite an often-global reach of academia via transnational "epistemic communities". Yet, South Africa's global ambitions as a rising power give this paper a broader significance. For rising powers, the need for investment in and engagement with research has a particular "twist" on at least two levels. First, domestic development has led to differentiation in society, which comes with increasing, and often contradictory, demands from diverse parts of the population. Different

1 In the context of this research project, the term "science" includes both natural and social sciences. Furthermore, the authors use the terms "research" and "science" interchangeably here.

needs have to be balanced – resulting in a "great (societal) transformation" internally, which still has to be organised within a local ecosystem that makes (quality) human life possible. In practical terms, levels of pollution have to be regulated and managed, as well as water supplies, transport, and other elements of urban planning. This, in itself, requires making space for a broader engagement of science and academic research.

For rising powers, we have an additional, second element to consider: their global footprint. When discussing rising powers, we discuss a social category, which usually is vaguely defined as an ability and willingness to engage globally (Grimm, 2016) and thereby to play an active role in global governance. This, the authors of this text would argue, includes the ability to engage in research and science, which can be understood as an end in itself; knowledge cooperation is one element in international relations. It can and should, however, also be understood as more instrumental: as able to engage with joint problem identification and joint solution seeking – and as able to provide backing for interpretations of the above within the global governance framework. This reasoning would make a functional and able research system one of the conditions for maintaining – if not already acceding – to the status of a rising power. South Africa clearly regards itself as a rising power within Africa and, not least since having joined the BRICS club (Brazil, Russia, India, China and South Africa), also pursues global ambitions. It certainly is the leading country on the African continent in terms of the quantity and quality of research and its national science capacities.

South Africa comes with its own history and legacy – in the context of the research setting, most importantly, the internal challenges with regard to the long-term effects of the racist Apartheid regime. Academic positions need to be filled based on academic achievements, but even if merit-based selection is applied rigorously in the university system, the systematic disadvantages and stifling of academic ambitions of large parts of the population leads to a racially determined pre-selection, and the system is fundamentally flawed. This historical legacy is not one for a quick fix, as education and the training of educators takes time. The legacy is thus still very present in the academic system, 24 years after the first democratic elections. Widespread student unrest in 2017, initially about student fees, but subsequently also about the "decolonisation" of the curriculum, illustrated this point. This fault line in academia can be expected to have repercussions for the science–policy interface, as an interaction always means inter-personal relations. Both the global ambitions of South Africa as a country and individual transnational linkages in academic communities are the background to the following research, which investigates the interface between researchers within South African institutions and national policy-makers.

This discussion paper analyses the determining factors for the science–policy interface in the South African context, and explores the following two research questions:

1. Where are potential tensions in the interaction between research and policy-making?
2. How do generic or context-specific tensions in the science–policy interface play out in South Africa?

The paper is based on two fundamental premises: (a) Policy-makers need scientific input in order to make informed political decisions and to address current challenges; and (b) researchers have to engage with policy-makers in order to produce the required scientific input.

Our starting point is that academic, evidence-based (or evidence-informed) policy-making is recommendable in a complex environment in order to target policies at identified needs and groups, thereby saving resources and taking complex causal chains into consideration. The complexity of these considerations seems to be ever increasing, as seemingly short-term decisions need to include long-term and planetary effects. This general observation for policy-making is certainly true for policy aimed at sustainable development, which constitutes a complex goal system. In the global context of the 2030 Agenda and the SDGs, all member states of the United Nations (UN) agreed on the need for the generation, collection and use of data in order to ensure the successful implementation of the Agenda (UN, 2017). This does not, however, necessarily imply an expertocracy, rule by experts. Although complex chains of reasoning and methodologically sophisticated research offer explanations for a number of challenges that societies (or humankind altogether) face, these academic results come with new uncertainties. Researchers and policy-makers are faced with complex (methodological) uncertainties *and* the need to communicate their findings and policies in a comprehensible language in order to gain legitimacy for decisions.

In times of increasing complexity, expert deliberations become more important to a broader audience. In a democracy, trust in the system needs to be strong enough to accept expert opinions and deliberations. This requires public discussion of complex matters in a language understood by larger parts of the electorate to ensure legitimacy of policy decisions. As public debates are distinct from academic/expert deliberations, the communication usually requires researchers and policy-makers to an additional effort to remain (or become) mutually intelligible.

This paper serves to structure and explain the framework for the interaction between policy-makers[2] and researchers[3] in South Africa. The aim of the paper is to draw conclusions about the ability of the South African research setting to serve a science–policy interface. Additionally, this will hopefully help to identify starting points for actors – South African and international – who aim to foster an improved science–policy interface.

Conceptual remarks and limitations

The analysis of the paper is based on ten weeks of empirical research in South Africa. The research examined the practice of interaction between research and policy-making in two illustrative policy fields, namely (a) biodiversity conservation as a predominantly natural science-based discipline, and (b) international trade and investment as a more social/economic science-based discipline. The choice of two exemplary policy fields allowed for a closer look at various interrelated actors and enabled triangulation of interviews.

The team conducted semi-structured expert interviews with domestic stakeholders in the South African science–policy interface located in the provinces Gauteng and the Western Cape. Additionally, the team had interviews and several background discussions with German

2 In this paper, policy-makers comprise government ministry officials at the level of director and upwards in the hierarchy, i.e. the administrative backbone of a state. The term is thus not limited to the political apex, i.e. ministers or parliamentarians.

3 In this paper, researchers include university scholars and research staff in government agencies, think tanks, NGOs and consultancies.

actors who engage in knowledge cooperation or international science policy with South Africa. German interviewees were based both in South Africa and at headquarters of institutions in Germany. The intention was to take a closer look at the incentives and inter-institutional relations, including funding structures, which define or shape the interaction that researchers in South Africa have with policy-makers.

Between February and April 2017, the authors spoke to 108 actors. While the authors assured the interviewees that any statement would be non-attributable to individuals, because certain groups might present certain patterns in their answers, the authors used a code attribution to identify the background of interviewees, and the study presents statements by interviewees within certain categories. Interviews were conducted in the following groups:

- Policy-makers (indicated as P1 to P8)
- German science-cooperation institutions (indicated as S1 to S11)
- Government agencies and research councils (indicated as A1 to A20)
- Interest groups (indicated as I1 to I9)
- Consultancies (indicated as C1 to C3)
- Think tanks (indicated as T1 to T10)
- Universities (indicated as U1 to U24).

The presented research comes with some caveats. It is important to note that the interviewees were not asked for their institution's official perspective, but were interviewed as individuals with a focus on their personal experiences with, and opinions about, the interaction between research and policy-making.[4] Furthermore, the research team chose purposive sampling instead of randomised sampling as the sampling method for the research, in order to ensure that they could talk to experts in relevant fields. This implies that neither interviewees nor the institutions constitute a representative sample of the overall South African science system. To some extent, however, it might be a reflection of persisting demographic realities in the South African research institutions. The team has consciously aimed at including diverse population groups and a greater share of women than would otherwise be reflected in current demographics in South African academia.

Structure of the paper

The paper is structured as follows. Chapter 2 ("Background: Of requirements and tensions") explains the relevance of knowledge cooperation or science diplomacy as a form of international cooperation that gains additional importance in the context of the SDGs. This is followed by a discussion of different models of relation between researchers/policy advisers and policy-makers and the role that evidence plays in these different models. The chapter ends with the description of the various challenges the stakeholders might face when interacting with each other.

4 Even though asked about their *personal* views and experiences, some interviewees preferred to present their views rather as more abstract, institutional interpretations or directives.

Chapter 3 ("Framework for the science–policy interface in South Africa") contains an analysis of the conditions for interaction in South Africa. First, the different actors considered in this paper are introduced, with special regard to their interdependence. Secondly, the authors assess the general environment for the interaction between research and policy-making in South Africa.

Chapter 4 ("Characteristics and challenges of the interface") sheds light on potential challenges inherent in the South African system that potentially hamper the science–policy interface. It provides an attempt to find reasons for their persistence in order to develop possible solutions and suggestions on how to improve the framework.

Chapter 5 ("Conclusion and recommendations") summarises the findings of this study and contains recommendations for different groups of stakeholders theoretically capable of changing the incentive structures for the interface. The recommendations provide input for the idiosyncratic situation in South Africa. Some of these recommendations, however, can be relevant in other settings in different countries as well. The exemplary work on, and recommendations to, actors in South Africa might serve as a stimulus for other countries wanting to foster the science–policy interface or wanting to engage in knowledge cooperation or science diplomacy with other countries.

2 Background – of requirements and tensions

The use of evidence[5] often comes with a positive connotation – or is even considered as inevitable in policy-making. According to Broadbent (2012), "evidence-based policy has become a byword for policies considered scientifically sound, objective, long term in focus and – implicitly – 'better' than policies not based on research-based evidence". In addition, evidence has the potential to improve political decisions by contributing to the degree of objectivity, as opposed to other decision-making factors, such as the decision-making context, personal norms and values, or the interplay of actors involved in a decision (Newman, Fisher, & Shaxson, 2012; Punton, 2016). As Shaxson, Datta, Tshangela and Matomela (2016) put it:

> [I]t is the responsibility of elected politicians and the civil servants who support them to take decisions that are informed by robust evidence. Their focus is on evidence of "what works" – a convenient shorthand to describe the full complexity of evidence about what policy interventions have worked in the past, where, for whom, how and why, and what is the likelihood that they will work in future. [...][This is] to ensure that the evidence used is of the highest possible technical quality, sourced according to the relevant disciplinary standards and communicated effectively to policy-makers. (Shaxson et al., 2016, p. 12)

Besides the general importance of evidence in policy-making, the 2030 Agenda specifically highlights the role of evidence in sustainable development. The complex set of Sustainable Development Goals (SDGs) emphasises common challenges for human societies and sets a

5 In this paper, "evidence" refers to research-based work that fulfils academic criteria, such as representativeness or replicability (Katz, 2015, pp. 131-132).

context of mutual learning in which all countries can enhance their level of development by learning from each other's specific expertise.

In addition to the use of data as a necessary factor for the implementation of the Agenda, international knowledge cooperation and science diplomacy come into the picture (UN, 2017). The relevance of knowledge and international cooperation in research is mainly highlighted in the context of SDG 17 ("Partnerships for the Goals"). In detail, target 17.6 calls for improved "[…] international cooperation on and access to science, technology and innovation and enhance[d] knowledge sharing on mutually agreed terms […]". This target is especially important when looking at so-called rising powers that, like South Africa, can mobilise both skills and financial resources. Countries that combine the characteristics of developing countries with those of industrialised countries, as South Africa does, highlight aspects of international cooperation beyond traditional aid relations (UN, 2016).

Science cooperation – like development cooperation – should pursue the long-term objective of enhancing the lives of the citizens of the respective country, as Maja Bučar highlights (2012, p. 137). Bučar elaborates that

> doing research is not a luxury for developing countries: it is necessary for their economies' international competitiveness, provides them with knowledge and evidence base for policy decisions and contributes in resolving most pressing issues of their own development (Bučar, 2012, p. 139).

Science cooperation and development processes should thus be regarded as mutually reinforcing. Bučar speaks of "synergies" and "reduc[ed] duplication" through the alignment of research and development cooperation (Bučar, 2012, p. 142). According to this understanding, any cooperation on research, including science diplomacy, ought to work in terms of the development context. This includes consideration of the link between research findings and policy-decisions.

2.1 Models of relations between research and policy-making

Political decision-making and scientific research can be understood as two different rationales or spheres (Habermas, 1966, 1968; Lompe, 2006). Yet, these two spheres are linked. Besides science policy, which provides incentives and a conducive framework for the science sector, the most explicit link between those two spheres is the use of evidence generated by scholarly research for political decision-making. By adhering to academic criteria, scientific work distinguishes itself from non-scientific outputs such as purely opinion-based, selectively written publications (e.g. opinion editorials) or rather tactical communication advice ("spin").

Three main models of policy advice are distinguished in the literature, depending on the role attributed to different groups and thus the type of exchange between them: the decisionist, the technocratic and the pragmatic model.

The decisionist model's main characteristic is the dominance of policy-makers in decision-making. The researcher's role is limited to the provision of independent knowledge and input for decision-makers. They are not supposed to have any influence on the decision-making process and only get involved in this process if commissioned by political actors.

Politicians hold the power to make decisions according to their own assessments; they only selectively use scientific input to the extent that they deem it necessary (Habermas, 1966, pp. 130-131; Lompe, 2006, p. 28).

In contrast, the technocratic model is characterised by scientific knowledge directing the decision-making process. A researcher's recommendations and scientific input are thus decisive for political decision-making. Policy-makers merely act as the ones realising science's recommendations (Habermas, 1966, p. 130). A technocratic relationship involves the "scientification" of politics, meaning that politicians become increasingly dependent on researchers' knowledge (Lompe, 2006, p. 27).

"Evidence-based policy-making" is an often-used term in the debate. This phrase could be understood as favouring the technocratic model, as it implies that scientific results are (or should be) a determining factor for political decisions. In contrast, the wording "evidence-*informed*" policy-making seems to reflect the decisionist approach, as it rather suggests that evidence is but one influencing factor alongside other determinants, such as the decision-making context. Both models face the problem of legitimacy and, consequently, of social and political sustainability. As for the decisionist model, political decisions lack independence and rationality because they are not based on scientific knowledge. The legitimacy of those decisions can therefore be questioned. In contrast, the legitimacy of technocratic decisions can be challenged due to the dependence on scientific input and the lack of participation by the public in the decision-making process (DIE, 2016, p. 4).

The third role definition of policy advice, the pragmatic model, goes beyond the traditional, "linear" thinking (Lompe, 2006, p. 30). It views researchers and policy-makers as independent but as constantly engaging and communicating with each other. It depends on the respective context whether researchers' recommendations or politicians' views dominate the decision-making process (Haldenwang & Alker, 2009, p. 1). The relationship is an open two-way process. Researchers can proactively share their findings with policy-makers, i.e. communicate their research results. Policy-makers, for their part, can also ask for specific input, i.e. commission researchers.

Communication between the spheres is the crucial point here. In the pragmatic model, the discussion between research and policy-making is understood as being enriched by the inclusion of both sides' views and expertise; thematic and systemic knowledge complement each other. The model further considers that political decisions are not taken by one single actor at a specific point in time. Rather, they constitute a task for a variety of actors over an extended period, and the variety and interplay of actors as well as sequencing of discussions are thus points for consideration. Both researchers and policy-makers should be contributing knowledge from their respective sphere. Consequently, scientific input should not be limited to one specific moment in the decision-making process but can be important at different stages or even ignite the debate around certain policy problems. Research findings have a role to play in all stages of the policy cycle and therefore researchers – directly or indirectly – can provide input throughout the process and, indeed, decision-makers expect them to do so (cf. Paine Cronin & Sadan, 2015). This relation also implies that scientific knowledge cannot be as independent and value-free as it is assumed in the decisionist model (Lompe, 2006, pp. 29-30).

In a further elaboration of the pragmatic model – and as a more constructivist approach – a model of "co-production" emphasises the *continuous* communication between the spheres. Jasanoff (1994, p. 20) discounts the assumption that "scientific fact finding stands apart from and prior to politics", meaning that research cannot be understood to be inherently non-political. Co-production is characterised by the fact that research is part of societal practices, norms and institutions and thus to some extent always influenced by those factors (Jasanoff, 2004). The awareness of this point is of particular importance in politically highly polarized settings, where trust, or the lack thereof, plays an important part in the research–policy interface. It is, however, a fact in all research–policy interactions. The co-productive model of policy advice is therefore a result of exchange and discourse in which neither politics nor research exists in isolation. At the extreme, co-production of knowledge can blur the lines between research and politics, which subjects this model to criticism. Specifically, in a setting of co-production of knowledge, clarity about roles and possibly divergent rationales is important. It is in light of this criticism that the subsequent section presents tensions between policy-making and research.

2.2 Research, policy advice and policy-making – an uneasy relationship?

This sub-section introduces some of the tensions discussed in the literature when examining the link between research and policy-making.[6] These tensions are a result of different rationales that actors need to be aware of. It needs to be emphasised that the discussion is about bridging a gap, i.e. to enable communication across a persisting divide, not to merge or blur roles.

Divergent rationales: The rationale of researchers and policy-makers differ. Often, policy-makers wish for easy-to-implement answers from research, and need quick solutions to pressing policy challenges (Strydom, Funke, Nienaber, Nortje, & Steyn, 2010, p. 2). Yet, research needs a theoretical foundation in order to be able to depict the complexity of problems while ensuring applicability. Furthermore, interpretations of findings also depend on predominant discourses in so-called "epistemic communities" (Haas, 1992), i.e. varying research foci in different research disciplines. In other words, political scientists will look at challenges differently from, say, economists or psychologists or anthropologists – not to mention natural scientists. Different mindsets also come with different expectations. Policy advisers tend to overestimate the relevance of their recommendations or underestimate the institutional complexity of the political system and the knowledge that policy-makers can contribute. Policy-makers, on the other hand, tend to underestimate the potential of scientific contributions and might overvalue their own perceptions of policy problems (Messner, 2003, p. 171f.). The clarification of each party's expectations at the outset of any activity and regular communication between the spheres are key to overcoming this challenge (DIE, 2016, p. 6).

Differing time horizons: Different time horizons lead to a time gap between policy problems and recommendations. Scientific research tends to take a relatively long time due to requirements for evidence-based scientific work. Yet, numerous problems on the political

6 For a more detailed listing of possible tensions that can occur in the interaction between research and policy-making, see for example Messner (2003).

agenda are highly influenced by the public debate and election cycles. Context-specific situations for decision-making are often not predictable; forecasting them in political planning is thus extremely difficult.[7] For instance, after the nuclear disaster of Fukushima, Japan, Germany decided drastically to accelerate its nuclear phase-out ("Energiewende"), despite previous (contested) policy decisions to the contrary. Additionally, decision-makers often want to implement policies within an election cycle or another relatively short period of time to ensure their re-election (Godfrey, Funke, & Mbizvo, 2010, p. 36; Jones, Jones, & Walsh, 2008, p. 9; Messner, 2003, pp. 175-176; Strydom et al., 2010, pp. 2-3).

Bridging linguistic games: In academic discourses, the applicability of research is often not the main objective. Researchers seek to contribute to theory-building, i.e. understanding causal relations. In contrast, policy-makers use an operative language. They want to reach certain political targets, deal with crises or finalise negotiations (Müller, 2007, pp. 223-224). Translation of different languages is thus one task when trying to bridge the gap. Godfrey et al. (2010, p. 39) suggest the establishment of "knowledge-broker positions" in research and government as an intermediary party between the two spheres. Policy advisers need to understand both sides to be able to fulfil their role as translators (Müller, 2007, pp. 223-224).

The legitimacy dilemma: Policy-makers tend to use research to legitimise political decisions, or to criticise selected scientific results in public in order to strengthen their own position. Researchers, on the other hand, may formulate recommendations in a way that appears to leave policy-makers with only one option – the one the researcher deems the right one. The selective use of knowledge is problematic. Neither research nor policy advice can replace public debates, which should be part of the political decision-making process (Müller, 2007, p. 218); alternatives are always imaginable and possible.[8] Policy advisers have to take on their role as an "honest broker" of knowledge, making transparent the insecurities of scientific knowledge and presenting several options to policy-makers to resolve this tension (Wagner & Weingart, 2015, pp. 10-11).

Radical versus incremental change: A further tension relates to policy alterations: Scientific experts might recommend far-reaching reforms to address complex situations such as globalisation or climate change. Those profound (or radical) reforms might provide strategic and long-term direction. Yet, the advice often results in incremental reforms while radical changes are procrastinated over. This is likely to frustrate policy advisers (Jones et al., 2008, p. 9; Messner, 2003, pp. 179-180). Organisational theory argues that researchers underestimate the slowness of organisational change. Radical change requires "complex learning", i.e., modifying existing values and procedures to cope with new situations. Yet, organisations are only capable of "simple learning", which is based on the application of existing rules in established institutions. Time needs to be accepted as a necessary factor in the process of radical change and successive reforms of routine actions (Messner, 2003, pp. 179-183).

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7 In scenario-building, these events are the "wild card" or "black swan", which usually serve as a reminder of sudden and unexpected turns of events (Taleb, 2007). They might result in sudden acceleration of policy-formulation – and might also result in a U-turn from previous decisions.

8 This, of course, is not a statement about the value-based decision on the *desirability* of these alternative futures, which researchers also might consider. This is no plea for a politically "neutral" science, but rather an emphasis on the need to be aware of one's own value judgements and the distinction between them and analytical facts.

In sum, the described tensions show that the interaction between research and policy-making has to be designed and framed carefully to ensure that research findings can actually be used for political decisions. Two- or even multi-way communication and translation are crucial to achieving mutual benefits of the interaction. It is also necessary to establish a common and coherent understanding of the functions of policy advice among the different actors to avoid differing expectations and miscommunication (Jones et al., 2008, p. 12).

With these theoretical considerations about the different roles and tensions in the relationship between research and policy-making, the research team will take a closer look at the institutional setting in South Africa. The aim is to explore how the system sets incentives, or not, to bridge the gap between research and policy-making, and to find out what challenges for such an interaction may exist in the South African context.

3 The framework for research–policy interaction in South Africa

South Africa's system for policy advice is diverse; it can and does deliver sound advice. Public institutions and research agencies engage with policy-making in substance, and also engage with a broader public. This chapter gives an overview of the relevant categories of actors and inter-institutional relations. It finishes with an assessment of the general environment for the interaction between research and policy-making provided by South African science policy.

3.1 Institutional overview and inter-institutional relations

The interaction between research and policy-making in South Africa comprises a multitude of actors. The research team has grouped actors into categories. Yet, roles overlap in real life, and people move from policy-maker to think tank employee (or owner), or are both university teacher and think tank manager.[9]

The categorisation rather helped to conduct the research from a broad base and include a range of possible perspectives and roles when the research schedule came to planning interviews. The categories of different actors are as follows:

- *Policy-makers*, understood as ministerial staff at different levels of government, usually at director level or higher. They are those in charge of setting the agenda for, formulating, implementing, altering and evaluating sector-specific policies in South Africa.

- *Government agencies and research councils*, institutions that conduct and coordinate research on certain issues, at times coupled with monitoring tasks. These agencies and

9 To German observers, the overlap of roles appeared to be particularly frequent in South Africa. It remained unclear whether this was due to changes in careers due to a political transition, where systemic rupture also had individual consequences, and new opportunities opened up that were previously blocked in a racist and authoritarian regime, or previously pursued career paths became more difficult in the new setting. This observation of more "flexibility" could also be motivated by both a necessity due to financial constraints in the South African system, or an individual quest for variety and change in personal careers. Those are several motivations, and they are certainly not mutually exclusive.

research councils are partly funded through Parliament (disbursed by the South African government) and give policy advice to parliament and government.

- *Think tanks,* representing a category of researchers who produce outputs that generally aim at a high degree of policy relevance and at shaping national political decisions. They are usually funded from sources outside government, even though they might conduct commissioned research, too.

- *Interest groups,* including different NGOs. Interest groups also conduct and commission research and focus on advancing certain interests in the South African society. Besides NGOs with a broad value-based mandate, such as faith organisations or political parties, there are other lobby groups engaging in advocacy, such as environmental or social groups, industry or business associations as actors.

- *Consultancies,* profit-oriented companies carrying out projects or conducting commissioned research, including that for enterprises, and government entities. The distinction between these and think tanks is rather fluent, but think tanks usually have a thematic- and value-based mandate and thus an explicit motivation beyond profit.

- *University scholars,* comprising researchers from different thematic areas and different universities. Interviewees for this paper were from universities in the provinces of Gauteng, North-West and the Western Cape. Again, the distinctions are rather fluid, as scholars can and do also engage in think tanks or work for privately owned consultancies. The engagement can be sequential or even parallel in individuals' careers.

- *International actors* relevant for science cooperation, including researchers and policy-makers both from Germany and other countries who engage in multinational science cooperation with South Africa and/or set the framework for this cooperation.

3.1.1 Research institutions

Within the research community in South Africa, "racial segregation" (Apartheid) is a legacy with persistent demographic effects. Yet, with regard to international acclaim to the quality of output, South Africa's science, technology and innovation system is well established and one of the most advanced on the African continent. Universities and think tanks feature in international rankings and a number of institutions are usually ahead of their peers on the continent (McGann, 2018; The Times Higher Education ranking, n.d.). In international rankings, one will often find previously privileged institutions, which, based on their institutional reputation for quality and their rather affluent alumni/support network were able to transform their operations into the different political setting of democratic South Africa. Amongst these institutions are the universities of Cape Town, Stellenbosch, Pretoria, the Witwatersrand (in Johannesburg) and Rhodes University (in the Eastern Cape), think tanks such as the South African Institute of International Affairs (SAIIA), and agencies such as the Human Sciences Research Council (HSRC) or Council for Scientific and Industrial Research (CSIR). Some newly established institutions are mergers between previously segregated universities, such as the University of Johannesburg or North-Western University. The research team is aware of historical bias and discusses its effect on the research–policy interface further below, in the section on idiosyncratic challenges of the South African system.

Figure 1: Institutions shaping the South African science–policy interface

Ministries	Agencies	Think Tanks	Universities	CSOs
DST	NRF	SAIIA	WITS	WWF
DTI	HSRC	TIPS	UP	EWT
DEA	CSIR	IGD	UJ	Bird Life
EDAT (WC)	SANBI	ISS	Tshwane	Tutwa Consulting
	Cape Nature		North-Western	DNA Economics
	ACCESS		UCT	
			CPUT	
			Stellenbosch	

Source: Authors

All actors involved in the research system are framed as South Africa's National Innovation System (DST, 2013; The Research Council of Norway, 2014, p. 4).[10]

Science funding

The Department of Science and Technology (DST) is the primary agent of South Africa's framework for research and innovation. It is the key institution setting the conditions for the interaction between research and policy-making predominantly through its funding for research and development. The DST's responsibility is the coordination of government-funded institutions in South Africa (DST, n.d.), including the National Research Foundation (NRF), HSRC and CSIR. Universities, however, are within the mandate of the Ministry of Higher Education and Training. The DST emphasises the development and application of science as crucial for the success, growth, and development for all South Africans (DST, 1996, p. 8). Its role is rather one of incentivising and regulating the institutional framework, not one of interference at the level of research projects, as the South African Constitution guarantees freedom of expression, including "academic freedom and freedom of scientific research" in Article 16(1d). Research institutions such as universities are "generally regarded as autonomous", can thus not be forced to conduct research in a certain manner and are free to adhere to their own research agenda and quality standards (cited after: Mandlenkosi Dlamini SC, 1996, p. 282).

However, as the main financing institution, the DST sets incentives for the contents of research, and monitors the social and national relevance of science. The DST's key partner in science policy is the NRF, the agency responsible for the granting processes, the implementation of programmes and human resource development (NRF, 1998). While the NRF and the DST jointly define the key thematic areas to be funded (Interviews A1, 17.02.2017; P7, 09.02.2017), the NRF mainly acts as the national science administration

10 Privately funded R&D, conducted in and funded by private businesses, might be substantial, but is not included in the (public policy) focus of this paper.

body, keeping track of the graduation of PhDs and of papers published by South African researchers (Interview A13, 23.02.2017).

Due to its particular tasks and instruments, the NRF is situated a lot closer and thus often more visible to the research community than the DST. It serves as an intermediary agency between top-down policies of the government and research institutions (mainly universities) and researchers (Choge et al., 2014, p. 7). The institution plays a dual role. It firstly acts as an agency through the support of policy and strategy development. Secondly, the NRF also operates as a research facilitator as well as research performer through the provision of innovative science and technology research platforms (National Research Facilities) in different areas such as astronomy, zoology and biodiversity (NRF, 2016, p. 16).

Another institution working closely with the DST is the Academy of Science of South Africa (ASSAf). It organises and funds consensus studies conducted by outstanding researchers on topics relevant to national development. Throughout the interviews, it appeared that ASSAf has not fully unfolded its potential as a consultative body, and remains an actor with limited visibility in the science–policy interface – more so, however, from the researchers' than from the DST's perspective (Interview U17, 16.02.2017).

Government agencies and research councils

A crucial component of the South African science-policy framework are the government agencies – research institutions established by National Acts of Parliament. Institutions such as the CSIR, the HSRC and the South African National Biodiversity Institute (SANBI) receive between 30% and 60% of their budget from the state (Interviews A3, 13.03.2017; A10, 16.03.2017; A19, 13.03.2017; A20, 09.02.2017). Their main tasks include conducting and coordinating research, advising the relevant Minister with regard to research priorities, and offering training. The work of agencies, as for all government, has to be in line with the National Development Plan that defines specific outcomes, which the agencies have to deliver accordingly (Interview A6, 15.02.2017). To some extent, this plan sets the framework for the interaction between the agencies and the policy-makers (Interview P7, 09.02.2017).

The relationship between government agencies and the respective government department appears to be close, especially between SANBI and the Department of Environmental Affairs (DEA) as well as between HSRC and the DST. State funding – as core funding – comes with a defined degree of accountability towards government, but at the same time guarantees the basic functioning of the institutions. The degree of this accountability – how it is practised – is crucial for agencies' independence from government. South African agencies emphasise that they are autonomous in their work. Government priorities may influence the thematic orientation but not the exact contents or findings of the research. (Interviews A5, 13.03.2017; A15, 15.03.2017; A19, 13.03.2017).

Think tanks

The South African think tank landscape is broad, with many of them ranking in the latest "Global Go To Think Tank Index" of 2017. South Africa was ranked 13 in terms of the number of think tanks in a country. With 86 actively operating think tanks, South Africa ranks number one on the African continent, ahead of Kenya (53) and Nigeria (48). The following three think tanks, which are also listed in the Sub-Saharan African Top 30, play

an important role in South Africa with regard to the science–policy interface: the South African Institute of International Affairs (SAIIA) (6), the Institute for Security Studies (ISS) (7), and the Institute for Global Dialogue (IGD) (28) (McGann, 2018). The research team conducted interviews with all of these institutes.

South African think tanks usually interact with a variety of actors working in a ranging of organisations, from academia, NGOs and consultancies to government departments at different levels – national as well as provincial (Interviews T7, 17.02.2017; T8, 16.02.2017). They often compete for donor funding and space for influence in policy-making – and, related to both previous points, for public attention. South African think tanks' relationships with government departments vary immensely. Institutions such as the IGD or Trade & Industrial Policy Strategies (TIPS) have a relatively close relationship, which, in terms of political reliance on them, is comparable to the ones between government agencies and policy-makers. Both are relatively recently founded institutions (post-1994), which thus come without historical "baggage" from the Apartheid era. Furthermore, they obtain a majority of their funding through public sources, often from government departments. Other think tanks, such as SAIIA, are older, traditional institutions with a past that goes back into the time of Apartheid. This does not necessarily mean that institutions actively compromised themselves by collaborating with the previous regime. The institutions, however, will have made compromises in an authoritarian setting in order to ensure operation; they were certainly not in open opposition to the Apartheid states, as that would have ended their work. The point here is predominantly about perception of institutions, also expressed more or less openly in interviews.

Think tanks often act at some distance from government, and are obliged to obtain funding from sources beyond the public purse. While this gives them more independence from public institutions, it also makes funding more volatile and adds to government suspicion of a somewhat "biased", government-critical institutional disposition. Overall, institutions like IGD often respond to requests from government and are thus more demand-driven, while "traditional" think tanks are a lot more supply-driven in their relationship to decision-makers, actively trying to feed their information into the policy-making process (Interview T1, 24.02.2017).

Universities

South African universities are autonomous institutions, but undergo some external control due to subsidies received by government. Yet, some structural decisions (e.g. appointment of chairpersons, loan granting) have to be approved by the Minister, who thereby influences the setting in which research is conducted (Mandlenkosi Dlamini SC, 1996, pp. 316-317). Across the academic landscape, it is common to collaborate with national and provincial ministries or even with institutions at the municipal level – the local level being highlighted in a very positive way in several interviews (Interviews U5, 22.03.2017; U22, 22.02.2017). Specifically, from the internationally competitive universities in this research's sample, university scholars frequently engage in international collaboration, for example, through joint research projects. Several university scholars rated their relation with policy-makers to be quite good. While academic institutions receive their funding from the NRF, this does not necessarily create any other kind of interaction between researchers and actors in science policy. University scholars can apply for open calls issued by the NRF; NRF programmes imply that there is a larger public (and government) interest in the topic area. Yet, university

scholars often stated that they did not know what happened to the work they delivered. The overall impression from interviews was that current science-policy framework does not incentivise feedback from policy-makers.

Interest groups

NGOs need to interact with policy-makers to some extent due to the nature of their work – trying to bring about policy change and furthering their interest. Some of them also perceive themselves as an intermediary between research and government, as their staff conducts field research and collects data, which it uses to influence political decisions (Interview I4, 01.03.2017). Several interviewees were quite critical with regard to the role of consultants in South Africa, questioning their price–performance ratio and the independence of their research, given that consultancies were rather perceived as driven by profit orientation and the aim to satisfy their clients (Interviews A2, 17.03.2017; C2, 01.03.2017).

International actors

International institutions cooperate with South African science policy actors and thus become part of the framework that is set for the interaction between research and policy-making. For example, Germany and South Africa signed an intergovernmental agreement on cooperation in the area of science and technology in 1996. Main cooperation activities between South Africa and Germany include joint research projects, usage of each other's research facilities, holding joint events and seconding experts (BMBF, 2016). German–South African science cooperation primarily aims at enhancing research excellence. This emphasis is important, and might be a limitation with regard to development impact, as this mandate might not directly result in capacity development, nor does it focus on the impact of research for the wellbeing of the South African population. On an institutional level, the DST closely interacts with the Federal Ministry of Education and Research (BMBF). The NRF cooperates with its German equivalent, the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) and the DLR Project Management Agency (DLR Projektträger).

Cooperation is often based on an understanding of mutual interest. On the German side, BMBF asserts that Germany will benefit from the exchange of international expertise, stay internationally competitive, ensure its visibility in the international sphere and develop advanced policy options and solutions (BMBF, 2014b, p. 2; 2017a). The Ministry has defined four main targets in international cooperation:

- Strengthen international research cooperation with leading countries in the world
- Develop further potential for innovation
- Cooperate with developing countries
- Take responsibility in the international community and deal with global challenges (BMBF, 2017b).

South African actors aim to maintain and enhance the country's international links. Becoming a visible actor in international science cooperation will enable South Africa to ensure the representation of its own interests (including in Africa) and its global competitiveness (DST, 2011). South African science cooperation defines several objectives:

- Generate funding for science, technology and innovation
- Increase South Africa's international visibility
- Shape the regional and international discourse and agenda on science and technology
- Strengthen national capacities and excellence in science, technology and innovation (DST, 2011).

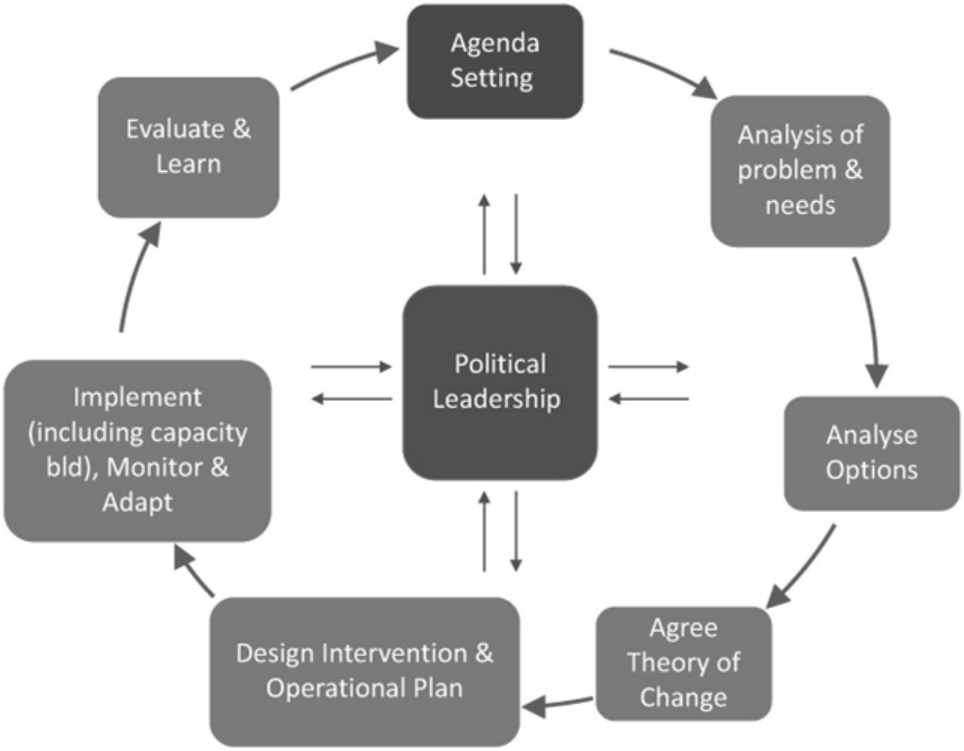
German actors emphasise the partnership to be one of "mutual interest". However, South African researchers and policy-makers do not seem completely to share the perception of eye-level cooperation and mutual benefits, which might result in a discrepancy between aspiration and the assessment of international science cooperation with South Africa. In any case, the explicit objectives do not include the fostering of the interaction between research and policy-making in South Africa (Interview S6, 24.04.2017).

Cooperation in research is not limited to science administration cooperation. With regard to specific research endeavours, other relevant actors include German political foundations that work in partnership specifically with South African think tanks, political parties, public institutions (e.g. Human Rights Commission) and civil society organisations. They are important funding sources for these institutions and, through the nature of the German foundations' mandate, seek policy or societal relevance, i.e. they implicitly and explicitly promote the use of evidence in policy-making (Interviews S1, 21.02.2017; S5, 23.03.2017; S8, 28.02.2017).

3.1.2 When and how to engage in policy-making?

An important question for those providing and seeking policy advice is when and how to engage with each other. In literature, the policy cycle is offered as an ideal type for the analysis of policy processes (Hayes, 2001; Windhoff-Heritier, 1994), comprising five steps: (1) agenda setting, (2) problem analysis, (3) policy formulation (or design), (4) implementation, and (5) evaluation, and then starting anew. This depiction of the policy process offers various points of engagement with evidence-based policy advice. In political reality, the process is more messy, including in South Africa. When it comes to the use of evidence for policy-decision, interviewed decision-makers reported numerous problems with this ideal. Paine Cronin and Sadan 2015 thus suggested a modified policy cycle for South Africa (see image below).

Figure 2: Stages of policy cycle suggested by officials in South Africa



Source: Paine Cronin & Sadan (2015, p. 7).

After the experiences with systematic abuse of political power during the Apartheid era (and, in fact, the previous colonial regime), post-transition South Africa has developed a rather extensive framework for policy consultation and engagement with civil society, demanding meaningful participation of the public in policy formulation. Consultation processes are open to individuals and to organisations, thereby offering opportunities for individual researchers and think tanks. As a think tank interviewee noted, there is a body of litigation before South African courts clarifying what constitutes a "meaningful" process of participation (Interview T6, 15.03.2018), meant to prevent government from receiving input and carrying on regardless. This does not, however, detract from parliament's constitutional primacy to decide over policies. Yet, in South African practice, government appears to be the strongest player in the policy process. As empirical research has shown in a survey of senior government perceptions: "Of 33 respondents on this issue, 23 indicated that the perspectives of beneficiaries have very little influence whilst the pattern of involvement of (mainly government) implementers and those that are the 'targets' of policy is more varied. […] beneficiaries are treated as 'consumers' of policy" (Paine Cronin & Sadan, 2015, p. 7).

In this light, it is no coincidence public consultations do not feature in the revised policy cycle by Paine Cronin and Sadan (2015). When policies are presented for consultation processes, they are already drafted and internal policy coordination and debates within government will have taken place. Policy advice, in this case, would be reactive and rather assist with policy planning than with policy formulation. More effective, as interviewees from think tanks and policy agencies highlighted (Interviews T6, 15.03.2018; Interview A2, 17.03.2017), was a more "direct line" to officials and continuous engagement with decision-makers. Often, the understanding of decision-makers was "officials in government

departments", indicating a strong role played by the executive in the process. At times, however, interviewees also highlighted the specific role of engaging with parliamentarians, be that for readings of bills or other parliamentary scrutiny over government, such as committee work or question time (Interviews T9, 03.03.2017 and T6, 15.03.2017).

3.2 Overall assessment of the framework for the science–policy interface

As the institutional relations between research and policy-making show, the science–policy interface is part of the aspiration in the South African context, and both spheres are convinced that interaction is relevant and worth striving for. This is despite a more informal practice than the official policy process would suggest. Respondents perceived the environment for research and policy advice as positive – especially because science and technology were regarded as a clear priority for the national government (Interview P1, 13.02.2017). The stakeholders seemed generally satisfied with the framework as set by science policy. Importantly, the benchmark for comparison matters in this regard, as interviewees expressed their belief that the conditions were much better than in many other countries (Interview U5, 22.03.2017). International actors in the area of science cooperation also regarded South Africa's science system as quite elaborate. This, it was felt, gave the country a profound basis of knowledge, contributing to its independence from other (donor) countries (Interview S8, 28.02.2017).

Despite the overall satisfaction with the framework, science-policy institutions – such as the NRF – were not necessarily perceived to be actively promoting (incentivising) the interaction between research and policy-making (Interview A11, 10.02.2017). Nevertheless, several actors commented very positively regarding the DST, describing it as providing "a conducive and responsive environment" (Interviews A13, 23.02.2017; A15, 15.03.2017; U7, 21.02.2017). For instance, the DST had mandated one of the government agencies to cooperate with universities because the gap between the two actors was perceived as too big. This instigated joint projects improving the interaction between the two (Interview A3, 13.03.2017).

Research communities in South Africa around different policy fields are relatively small. This entails advantages such as higher local profile or influence; as one researcher in the field said: "it's easy to be a big fish in a small pond" (Interview U12, 14.03.2017). In a setting with a limited number of actors, relationships are easier to establish and to maintain. However, domestic acclaim for one's work is also limited because of the small number of people engaged in the respective field (Interviews U3, 22.03.2017; U12, 14.03.2017).

In German–South African science cooperation, the German side highlighted applicability and measurable impact as crucial. Applicability was described as a major criterion for collaboration, notwithstanding the importance of fundamental research (Interviews S1, 21.02.2017; S3, 08.02.2017). However, South African actors did not confirm this self-ascribed relevance of international cooperation; they tended not to establish a link between international actors and the policy relevance of research.

Similarly, only very few South African respondents mentioned the 2030 Agenda and its Sustainable Development Goals (SDGs) or – when asked about the role of the SDGs – the goals were not perceived to be affecting the science–policy interface in any way, except

that, in the area of education, several actors mentioned the importance of scholarships, international student exchange programmes and sustainable education (Interview S3, 08.02.2017). In contrast, German actors in international knowledge cooperation and science diplomacy with South Africa mentioned that the SDGs do have a noticeable influence on their agenda (Interview S4, 20.04.2017). For policy documents, however, the SDGs were rather "fresh" at the time of research. They might have more influence after they have "filtered" into the policy documents over time.

Across the institutional landscape of South African actors, it appears that institutions such as SANBI, which established a dedicated policy-interaction unit, would be most suitable to bridge the gap between research and policy-making. In contrast to the work at universities, scientists at government agencies are actively involved in management and practice on the ground, which is why they know about the procedures and pressures in government, facilitating the communication between the two (Interview A2, 17.03.2017). These knowledge institutions beyond universities thus play a crucial role in the research–policy interface in South Africa.

Besides the institutional relations, the research process – the *way in which knowledge is generated* – turned out to be a crucial determinant for the interaction between research and policy-making. Knowledge is not simply "consumed" by policy-makers, nor is it created entirely beyond considerations of decision-makers. Rather, the co-creation of knowledge and co-design of projects was discussed in South Africa and perceived as an increasingly important approach from both researchers' and policy-makers' perspectives. This approach implies continuous engagement, starting with the elaboration of a research idea, joint definition of the topics, processes and products aimed for. This allows bringing together the needs of policy-makers and the potential of scientific inputs, and thus provides a good chance to have an impact. As for the South African context, a joint study of the DEA and the Overseas Development Institute (ODI) specified that co-creation is an overall aim of the DEA itself when interacting with researchers (Wills et al., 2016). Overall, co-creation seemed to be applied only relatively rarely in the South African context. One of the reasons for this may be the fact that it comes with additional needs for time, effort and energy in communication and clarification of subject matter and methodology, involving both sides. It also requires a certain level of trust between the different spheres in order to ensure a mutual and constructive process (Interview U10, 14.03.2017). As the following section will show, the incentives for co-creation and trust being in short supply may hamper the impact of policy advice and thus limit the potential for transformation of research and policies.

4 The interface in South Africa – characteristics and challenges

Despite the well-institutionalised framework for the science–policy interface, and positive examples such as specialised units for translation between the spheres, the interviews for this paper identified several challenges. Some of them are idiosyncratic to South Africa; others are more general in nature and confirmed those described in the literature.

4.1 General tensions between research and policy-making

The challenges and tensions at work when it comes to interactions between researchers and policy-makers are consequently also at play in South Africa. Chapter 2 already introduced these general tensions for any research–policy interface: divergent rationales, differing time horizons, linguistic gaps, a legitimacy dilemma, and the radical versus incremental change. The following sub-section takes a closer look at these universal tensions and at how they play out in the South African setting.

4.1.1 Divergent rationales?

Inherently, policy-making and scientific research follow diverging rationales, as argued in Chapter 2. Researchers explore causal relationships. In South Africa, too, professional incentives often lead them to pursue the objective of publishing in high-impact journals in order to enhance their scientific reputation (Interview U15, 23.02.2017), according to the motto "publish or perish". Contrary to this, few if any incentives exist for the authorship of short and concise policy-relevant outputs; this currently is only done by personal choice (Interview U2, 17.03.2017). Policy-makers, for their part, tend to demand high applicability of research findings. Their ultimate objective usually is to solve problems and address challenges, hence seeking an impact on society (Interview P6, 22.03.2017). Both sides need to keep these differing rationales in mind while interacting, and need to communicate their respective expectations with clarity.

Policy-making in South Africa does, indeed, engage with research, even if the relationship is considered to be insufficiently dense (or engaging) from both the researchers' side, as our research showed, and from decision-makers' perspective (Paine Cronin & Sadan, 2015). In fact, several interviewees in the area of biodiversity stated that agencies are actively involved in jointly developing policies with the Department of Environmental Affairs (DEA). Researchers from social science agencies phrased this more cautiously, and underlined that they do not see it as their task to give specific advice on political issues, but rather to provide the necessary research to inform the decision-makers. Drawing conclusions as to what political actions are necessary, these interviewees emphasised, are the task of policy-makers themselves (Interviews A5, 13.05.2017; A6, 15.02.2017).

In the area of biodiversity, the framework for interaction between policy-makers and researchers is elaborate. Interviewees described the science–policy interface as a highly relevant issue. Relations are, at least in some cases, institutionalised: "There [are] very few biodiversity scientists in South Africa [who] don't do science–policy interface" (Interview U3, 22.03.2017). The DEA has a "Science Policy Intelligence" unit, which deals with the interface between research and policy in the area of biodiversity conservation. Its counterpart

and frequent communication partner is the "Biodiversity Policy Advice" unit at SANBI. SANBI assists the DEA in policy development and implementation and develops policy tools (SANBI, 2014). One university scholar working in the area of biodiversity even described the relationship with the words: "SANBI actually is government" (Interview U19, 22.02.2017). The reason for the very close relationship with the DEA is presumably the ministry's specific engagement regarding the interaction with researchers and the development of an evidence-informed decision-making strategy (Interview A13, 23.02.2017).

In the area of international trade and investment – in marked contrast to biodiversity conservation – the research–policy interface is much less established. In this policy area, there is no formal government agency enjoying the same relationship and privileges as do SANBI or the HSRC. Instead, the Department of Trade and Industry (DTI) works closely with TIPS, a research institution originally created in 1996 as an independent secretariat supposed to support the new South African government with policy analysis. In 2001, TIPS evolved from its secretarial status into a not-for-profit research institution, commissioned to assist the DTI (TIPS, 2017). Possible reasons for the absence of a clearly mandated government agency in trade policy could be in the history of TIPS: it was created with financial support from the Canadian International Development Research Centre (IDRC). The IDRC highlighted the aim to ensure TIPS would provide "independent advice on economic policy" and to "bring the quality of research done locally closer to international best practice" – thereby possibly aiming to avoid a clear legal relation as is the case for agencies (IDRC, n.d.). Nowadays, TIPS also receives state funding (as agencies do) and is perceived as an intermediary between researchers and policy-makers, if not an "extension of DTI" (Interviews C3, 20.02.2017; U10, 14.03.2017).

Besides the DTI, the National Treasury is also an important ministry for the interaction with researchers in the trade area. Several interviewees in the trade area have indicated that the relationship with the DTI is difficult and characterised by a lack of mutual trust, which hampers the interaction. In contrast, the relationship with the National Treasury seemed to be less problematic, and some mentioned it as an alternative "entry point" in the South African system. Treasury appears to have a high demand for scientific inputs, which could be one of the reasons for the better relationship between researchers and policy-makers (Interviews C2, 01.03.2017; T2, 17.02.2017; T6, 15.03.2017).

4.1.2 Time horizons – always at odds?

As has been mentioned in Chapter 2, researchers and policy-makers face different time horizons and constraints (Godfrey et al., 2010, p. 36; Jones, Jones, & Walsh, 2008, p. 9; Messner, 2003, pp. 175-176; Strydom et al., 2010, pp. 2-3). In South Africa, all interviewed actors seemed to be aware that the differing time horizons of researchers and policy-makers are inherent to the professional roles they have to fulfil; the awareness eases tension, yet will not resolve them.

Expectations of time horizons can be at odds in numerous ways. Policy environments change very rapidly, and since politicians at the higher echelons of government in democracies face the re-election constraint, they are pressed to bring about societal impact within a short period of time (namely their term of office). This implies that when they prepare decisions, evidence around these decisions needs to be delivered as quickly as

possible – and ideally in support of the envisaged policy measure. Policy-makers "want the answer now", as a researcher from a research council stated (Interview A20, 09.02.2017). Time is generally in short supply with high-ranking decision-makers, as a researcher emphasised: "you have only five minutes to capture their [i.e. policy-makers'] attention" (Interview U7, 21.02.2017). This stands in contrast to the fact that sound research "is time-consuming" (Interview U9, 21.02.2017) and issues to present are usually complex matters. Research and condensations of research findings into sharp, but still factually accurate, messages both take time. In academia's ideal world, scientists should be able to conduct their research until they come across interesting and relevant results. However, real life is less idyllic: "You have to spend months in the field, get back to the lab, get the data cleaned and you have only few people" (Interview U23, 16.02.2017). At the same time, once results are presented, researchers often expect political change very rapidly. Furthermore, agreeing on terms for studies is an additional time factor. Several scientists from agencies explained that scientists want to move rather fast in bringing about changes in thought, whereas "on the government's side, wheels turn very slowly" (Interview A14, 15.02.2017). One academic elaborated: "For a three-month project [i.e. a commissioned study], I have to bargain for nine months. That's government." (Interview U22, 22.02.2017). Scientists have to bear in mind that government is bound to administrative structures and "due process" which (deliberately) prevent ad hoc and sudden changes. These two divergent time horizons do not match and inevitably lead to frustration due to unrealistic expectations on both sides.

The unique and sometimes ambiguous role of government agencies – in the context of this study: mainly in the biodiversity sector – was underlined by conflictive expectations from their counterparts in government and academic requirements. On the one hand, agency staff are expected to conduct research. On the other hand, rather short-term demands by policy-makers tend to highly impact on their daily work. Several staff members of different conservation agencies strongly emphasised that they work under strong time pressure. They stated that they do not have the time to do "full-on research" within their regular working hours – yet, this was expected of them, nevertheless (Interview A7, 13.03.2017). Apparently, a requirement for any agency researchers was to produce three to five scientific outputs per annum in order to maintain and expand their scientific portfolio. Regular "everyday" work for the agency did not count as part of the scientific portfolio, so that researchers had to conduct the requested research in addition to their regular work (Interview A4, 14.03.2017). Most of the interviewed agency researchers saw themselves as "knowledge brokers", which illustrates the complexity of agencies' roles in South Africa (Workshop in Cape Town, 05.04.2017). They thus felt under substantial pressure to fulfil both the research and the communication roles at the same time. One agency staff remarked that she has to use the weekends to conduct research (Interview A13, 23.02.2017). Policy-makers' lack of comparison with other policy fields might serve as an explanation as to why they have ambiguous and often non-viable expectations of conservation agencies.

4.1.3 Bridging linguistic games

Researchers who do find a way to disseminate their findings to policy-makers have to target their message well in government and, equally important, they have to know *how* to communicate with policy-makers. The receptiveness and responsiveness of government increase if researchers manage to address the right individuals within the ministry: "If you don't know whom to send your information to, it gets lost. You have to find out who could

benefit most from the findings and then [target] that person" (Interview A14, 15.02.2017). Different jargons and deficiencies in communication was the second tension the authors came across in the literature. This, too, seemed to be well-known to all interviewed stakeholders in the science–policy interface in South Africa.

Researchers, especially from academia, often work in isolation from other actors. Specialisation is traditionally a virtue in academia, and this might negatively impact the ability to share results with others. In fact, the very value of communicating results might, at times, be forgotten in highly specialised "epistemic communities". Some interview partners thought researchers were "terrible communicators", in the words of a university staff (Interview U19, 22.02.2017), or simply "threw their results over the walls of the government", as a government agency staff put it (Interview A11, 10.02.2017). Actively trying to disseminate and communicate research findings to policy-makers is often not part of the job description and/or training. University academics have no standardised formats they can derive from their job when it comes to approaching policy-makers. This implies that policy-makers receive a great variety of document formats from university researchers, which vary in length, language style and applicability. In contrast to this, consultants were thought to be closer to government and to know more about policy-makers' mindset and institutional limitations. Consultants mostly interact with government in the context of commissioned studies. This setting, with explicit terms of reference, automatically entails clauses on the communication of research findings after their generation and/or collection. University staff, however, often took a critical view of consultancy research, as lacking depth or nuances in the research and its presentation.

On the side of those elaborating evidence, some researchers from academia, think tanks, NGOs, consultancies and agencies – those who have gathered experience with commissioned studies – criticised policy-makers for not knowing exactly what evidence they needed (Interview A13, 23.02.2017). If policy-makers do not communicate clearly what kinds of scientific inputs they require, this might result in the ToR being unclear or leaving too much room for interpretation and (implicit) expectations. This, in turn, can easily lead to dissatisfaction and frustration on the input providers' side, but also on the recipients' side – if they are not receiving the information and the kind of input they need. The type of language used by researchers (especially from academia) is often very technical: "They use a lot of jargon" (Interview A13, 23.02.2017). Someone with a different professional background can therefore struggle to grasp the meaning of academic writing. In several interviews, researchers were criticised for not being good at summarising and packaging their findings in a way that extracts and condenses the main message – which, as has been mentioned under the apect of "time", fails policy-makers' needs for very short and concise documents.

As for the *how* of communication, researchers shared their self-perception of having a tendency to sound quite self-convinced and not "humble" enough (Interview U2, 17.03.2017). The term "respect" (towards decision makers) was mentioned several times in the interviews, which, beyond mere politeness, is a particular tension in the South African context. If policy-makers do not feel respected by researchers, they are unlikely to listen to their inputs, regardless of the content (Interview T10, 23.02.2017). This aspect of human interaction and psychology is especially important for consultants who work in a client–contractor relationship with policy-makers. Therefore, they have to be careful how to communicate any occurring difficulties because their professional success depends on

having good relations with government (Interview C2, 01.03.2017). Respect is important for all kinds of researchers engaging with government, as showing respect for the other party allows trust to be built and maintained. Obviously, in a pluralistic setting, researchers are allowed to disagree with regard to content and need to convey frank messages. Yet, they have to express any criticism with a tone of respect (Interview T1, 24.02.2017). The shortcoming in interpersonal communication was also mentioned, vice versa, in terms of policy-makers to researchers, which might have a basis in specific historical reasons in South Africa.

4.1.4 Legitimacy

Evidence legitimises decisions by providing a sound basis, e.g. by testing assumptions about larger and longer-term effects. In this understanding, evidence is used to ensure that policy-makers cannot base their political decisions on hindsight, subjective opinions and individual objectives (Interview P7, 09.02.2017). More disconcertingly, however, some statements rather indicated a use of research to legitimise pre-determined decisions: "We needed to hear it from the researchers, but we already knew what we wanted to hear" (Interview P2, 14.02.2017).

The issue of legitimacy is closely linked to questions around trust (see sub-chapter 4.1). As explained previously, the current debate in South Africa involves the idea of co-creation, which is closely related to establishing trust. One interviewee from a think tank emphasised that in his experience, legitimacy of research findings can be enhanced if policy-makers are included in the research process right from the beginning, e.g. through workshops in which they can contribute their views and opinions. He had the impression that if policy-makers only get to know about the research findings at the very end of the research process they might feel excluded and are therefore likely to be more sceptical of the results (Interview T1, 24.02.2017). Additionally, the discussion around legitimacy seems to be a question of power relation. Neither scientists nor policy-makers want to admit their "weaknesses"; each party wants to remain autonomous and not to be told how to do their work. However, "[b]oth parties have to acknowledge that they need each other. They need to acknowledge their mutual dependence." (Interview U17, 16.02.2017). Researchers also mentioned that they might face difficulties getting data necessary for their work from policy-makers, especially when it is sensitive information (Interview U12, 14.03.2017).

A good example of structures supporting evidence-informed policy-making in South Africa could be found in the DEA, which established a designated science–policy interface unit, tasked to enhance the processing capacity for evidence within the department. In addition, assessments and evaluations, e.g. of programmes within institutions, are ongoing. Obviously, this cannot be a statement about the policy content, and rather highlights the mechanisms as good practice. However, opinions on the level to which evidence-informed policy-making had advanced greatly differed between the actors; some saw it still "in its infancy" (Interview A1, 17.02.2017).

4.1.5 Radical vs. incremental change

The perceived impact of policy advice differed between policy areas, often due to choices in political priorities. Researchers from universities and think tanks need to understand the

incentive structures and constraints of policy-makers, lest they become frustrated when their results are not picked up. Since researchers are highly specialised, they tend to view issues from a very narrow angle (Interview U12, 14.03.2017). Respectively, policy-makers' generalist perspective often hinders them from recognising the value of individual research findings (especially when they are not in line with their party-political perspectives), and Paine Cronin & Sadan (2015) observed a lack of distinction between "policy" and "planning" among officials. Several actors from the field of biodiversity lamented a neglect of their policy field, especially in terms of funding (Interview I6, 28.02.2017). The simple juxtaposition of the figures for total government expenditures for the two relevant departments for this study might illustrate the point: the budget accounts for ZAR 6,848.2 million to the Department of Environmental Affairs (DEA) and total government expenditures of ZAR 9,274.8 million to the DTI (National Treasury, 2017). A possible explanation is that conservation was not perceived as directly linked to economic growth and job creation. A university scholar working on biodiversity conservation put it like this: "The moral imperative of [biodiversity] conservation is not attractive to someone living in a shack" (Interview U2, 17.03.2017). Environmental conservation was felt to be seen as a luxury that got prioritised only when a country reached a certain level of socio-economic development: "We call conservation the luxury of affluent societies", as an agency staff put it (Interview A8, 02.03.2017). In direct comparison (and competition for attention), the link between trade enhancement and socio-economic development is much more intuitive than the link between conservation and development. The narrative around specific findings becomes relevant, yet researchers often regarded it as a distraction and unpaid additional work. Some researchers made the point for their area of work within the overall policy rationale: "If you have environmental biodiversity-specific questions that jeopardize food security and the well-being of your citizens, then it should be a priority. This is where biodiversity conservation comes in." (Interview U6, 15.03.2017).

It is therefore important that both researchers and government officials engage in critical self-reflection before blaming the other party (Interview C2, 01.03.2017). An agency staff pointed to a previously strong "us and them" mentality between his agency and government until a few years ago (Interview A7, 13.03.2017). In order for the *inter*action to happen, parties have to acknowledge each others' rationales rather than see the flaws in the others' behaviour.

4.2 Challenges for the research–policy interface specific to South Africa

Besides general challenges in the research–policy interface, the analysis of the interface between research and policy-making in South Africa cannot ignore the country's history, which is both a specific challenge and a set framework condition for all interactions. The violent and segregationist political past continues to have implications for the everyday lives of the South African population; it certainly influences the interaction between research and policy-making, too, and often negatively so. According to many interviewees, existing tensions specific to South Africa are prevailing mistrust as well as persistent inequalities in the education system and a structurally underfunded research sector. Often, when an attempt is made to address shortcomings, international actors come into play, hence a specific mention of international actors in this section on South African challenges that exceed the general tensions in the interface between science / research and policy.

4.2.1 History and legitimacy – the "race" dimension

Even though the transition to democracy dates back more than two decades, the legacy of Apartheid still influences people's everyday lives and is reflected in the political and structural setting of the country. During Apartheid, the government promoted separate development of the different population groups (different "races"[11] in the wording of the Apartheid regime) through spatial, socio-economic and legal segregation. This segregation came with an implicit or explicit understanding of a varying "value" ascribed to different groups. The system was fundamentally skewed to favour the "white" population and pursued a policy of divide and rule towards perceived "other groups". As a consequence, the vast majority of South African interviewees for this paper stated that the historical conditions found in South Africa are unique and should therefore be taken into consideration. Interestingly, the majority of interviewees brought up the topic themselves before being asked about it, even though the historical setting will have been experienced and/or assessed differently by each of them (e.g. Interviews U17, 16.02.2017; U2, 17.03.2017; T1, 24.02.2017).

At the end of Apartheid in 1994, formerly "white"-dominated government institutions were subject to transformation, and have subsequently included previously excluded sections of the population, not least with regard to the "racial" background of their staff. In contrast, the "racial" composition of the staff in institutions independent of government and created before or during Apartheid (such as think tanks, consultancies and universities), seems to have persisted. One reason for the persistence of this unbalanced composition is the scarcity of skilled labour after transition – as a long-term result of previous discriminatory policies. Additionally, the pressure to change staff composition was more indirect and less immediate than in government institutions. Furthermore, think tanks and consultancies were attractive jobs for "white" former government employees, as they allowed – and sought – the application of scarce skills.

Socioeconomic disparities and inequality along racial lines are still clearly visible in the first generation after Apartheid. In economic terms, "the wealth still lies with the whites" (Interview U17, 16.02.2017). Consequently, as university education is subject to fees, the research and science environment in South Africa still tends to be white-dominated and remains divided (Interview T1, 24.02.2017). This raises challenging questions about representativeness of scholars and, in the South African post-Apartheid context, comes with challenges towards the legitimacy of academic findings, not least in social sciences ("80% of research is produced by white males over the age of 45 years", Interview A1, 17.02.2017). Throughout the years, several policies, summarised under the programme of "Black Economic Empowerment" (BEE), have been implemented to redress inequalities in economic terms based on "race", but also to give formerly disadvantaged population groups access to (political) institutions and, within these institutions, higher-level positions.

Transition in South Africa was peaceful, yet it was – and continues to be – with persistent sensitivities between groups. After the transition, many parts of the ANC-led government

11 The term "race" is both scientifically inaccurate in its application to human beings and is historically also highly negatively charged in a German setting. This paper uses the term, though, as it remains present in the South African discussion e.g. in policies on "affirmative action".

preferred to work together with universities beyond the legacy of "the oppressors", i.e. those institutions formerly known as "black" universities, and with think tanks and other research institutions that were newly founded and ideologically close to the ANC (Interview U18, 11.02.2017). One interview partner working for a South African think tank complained about lacking legitimacy for his own institution compared to others, which "is rooted in the history. [The institution] is a very white institution." (Interview T1, 24.02.2017). Even though government also works with research institutions that are said to be "white"-dominated, the history of domination of one group over others remained an issue in interpersonal relations: members of these institutions told the research team that they were still approached with caution and felt under special obligation to actively try to "build that bridge" (Interview T1, 24.02.2017). The same was expressed by university researchers who found it personally challenging for them as "whites" to find the right tone when approaching "black" government representatives. One academic scholar explicitly said that it took him a very long time to earn policy-makers' trust and that he thinks his complexion and his gender are reasons for this (Interview U17, 16.02.2017).

The continuation of racial categorisation (albeit with emancipatory intentions) was explicitly or implicitly criticised in the great majority of interviews, and also irrespective of the colour of skin of the respective interlocutor. The research team understood that it could be difficult for a "white" member of a research community to criticise the South African government and its choice of policy. Criticism was never regarded as neutral or purely evidence-based; all references to research were questioned for possible intentions of the speaker based on a racial/cultural/gender bias. Racial matters were highlighted as particularly sensitive, as a representative of a research agency stated: "the colour of skin matters for policy-makers when they demand scientific inputs" (Interview A20, 09.02.2017).

In this politicised setting, international cooperation that aims at "mutual benefit" and takes "excellency" as the predominant criterion is bound to face some difficulties. The redress of historical injustices and a political legacy of the past might not be the core task for international science cooperation. Yet, in a negotiated setting, compromises will have to be made and tools for addressing skills shortages (and structural disadvantages) are necessarily part of the picture, beyond the quest for excellency and mutual gain. Thus, at least implicitly, the research–policy interface cannot be ignored, even if not part of the official policy direction of the respective international partner, and must be part of a discussion that goes beyond mere debates on "impact" of research results.

4.2.2 Trust in a polarised society

The term "trust" – or in its negative form "mistrust" or "lack of trust"– was mentioned by a great number of interviewees of all categories of actors and within both policy fields. Besides historical injustices and racism (as illustrated above), there are several other, interrelated, factors that tend to influence the level of trust between different actors and institutions, such as credibility, seniority and political affiliation.

"Credibility" seems to be a major concern, especially for researchers. Individuals, however, work in institutions and are associated with their institutions. Building up or rebuilding a reputation as a credible research institution takes a long time. It requires actors who invest in and nurture personal contacts and networks (Interviews T6, 15.03.2017; T7, 17.02.2017).

A possible way to build up and maintain credibility is through delivering good research, i.e. research that is "accurate, robust and verified" (Interview I5, 14.03.2017). Young, rather inexperienced junior employees seem especially to struggle with building up credibility. As a junior researcher expressed it: "You can't go to them [the policy-makers] with a policy brief when the relationship hasn't been established." (Interview A3, 13.03.2017). These circumstances might lead to a certain degree of discouragement among the juniors, which can lead to them either performing poorly or changing position after a short time. The criticism was made that young professionals felt "held back and side-lined by their bosses because they do not have the same skills" (Interview I8, 15.03.2017). Concerning the sustainability of personal relationships, interviewees shed a critical light on staff rotation in government departments. According to them, the fluctuation makes it difficult to establish and maintain relationships between individuals (Interview A11, 10.02.2017): "All of a sudden, you get a new face there and you have to start all over again" (Interview I1, 18.03.2017).

From the institutional perspective, the closer a think tank aligns to government, the less persistent the challenge of mistrust from government (Interview T4, 17.02.2017): "Those who are more in line with you ideologically tend to be more likely to pick up your work." (Interview T2, 17.02.2017). This, however, is not a uniform pattern. Other voices were surprised by the fact, that despite their critical views as researchers, and their results thus not being in line with certain policy-makers' perspectives, they were approached by the same policy-makers a second time (Interview U24, 02.03.2017). Trustworthiness appears to be more complex than mere alignment with government perspectives, which is but one element in interpersonal relations, and predictability of actions and honesty might be other elements that build trust. This is fundamentally positive news for a democratic and pluralistic society with the need for resilient institutions.

In addition to persistent mistrust within the South African setting, a lack of trust also seems to be an issue between South African and international actors. One international actor shared her view that prejudices towards South Africa existed amongst Germans. The underestimation of the country – the lack of trust in its institutions and its future – might be problematic for the intensity and success of international cooperation between South Africa and other countries (Interview S7, 09.02.2017). Inversely, international funding of research institutions can sometimes lead to suspicion from the national government (Interview T4, 17.02.2017). Policy-makers might fear that foreign donors try to promote solely their own interests in the South African political agenda. They may further be apprehensive that loyalty and alignment to donor strategies could lead to intellectual alienation from the national government. Many interviewees from academia were convinced that international credibility is as important as national recognition, both for reasons of academic reputation and to ensure sufficient funding from external donors: "We should make sure that we are locally relevant, but we need to be globally recognised for what we do." (Interview U7, 21.02.2017). It appears to be the combination of an internationally and nationally established professional reputation and interpersonal trust that determines successful interaction between researchers and policy-makers in South Africa. In this regard, international actors in science cooperation – through targeted international exchange opportunities they provide for South African academia and whether purposefully or involuntarily – can perform the role of intermediary in the research–policy interface in South Africa, at least by offering insights into other settings for this particular relationship.

4.2.3 Education as a major shortcoming

Policy advice – the bridge between research and policy-making – requires a multitude of skills. Fundamental to all are adequate research skills, with regard to both substantive knowledge and methodological understanding. During the Apartheid system, the disadvantaged population groups (referring to all so-called "non-whites") were deliberately kept from acquiring higher levels of education and access to political space. Since 1994, South Africa has made great transformations with regard to non-discrimination and legally guaranteed equality. Basic services like water, electricity and housing have expanded to a large number of citizens previously deprived of them. Nevertheless, Apartheid's legacy has had a lasting effect on the availability and quality of education. The lack of adequate education was often been criticised in the course of various interviews (e.g. Interview A17, 07.02.2017).

According to the new constitution of 1996, "Everyone has the right (a) to a basic education […] and (b) to further education, which the state, through reasonable measures, must make progressively available and accessible." (Constitutional Assembly, 1996, Chapter 2, Paragraph 29). As World Bank statistics show, democratic South Africa spent about 6% of its GDP on education (in 2014), which is more than any other African country and also more than the world's average (4.1% in 2014) (World Bank, 2017a). The problem, in theory at least, does not lie with a shortage of funding but rather with the quality of teaching and the condition and equipment of schools and teaching institutions. This is also the case because the higher education system is simply not capable of handling the vast numbers of young South Africans who already are or who plan to be enrolled in one of the country's institution of higher education.

After decades of exclusion, formerly disadvantaged groups now demand university education. The strong preference for university education leads to a shortage of youth willing to undergo practically oriented vocational training, as an interviewee deplored (Interview S8, 28.02.2017). Several interviewees mentioned that the country is also lacking well-educated junior employees in the academic sphere, because often even those who officially have a matric degree (equivalent to a high school degree) lack skills they would need in order to work in higher (academic) positions. Even those graduates holding multiple degrees (bachelors, honours, masters, PhD etc.) were said to have limited scholarly capabilities and often limited understanding of scholarly contents (Interviews A11, 10.02.2017; S2, 17.02.2017; U19, 22.02.2017). One science cooperation actor stated that in her opinion, the South African affirmative action policy, as justified as it was in principle, has aggravated the situation that young (black) university graduates "are catapulted into positions they are not trained for" (Interview S2, 17.02.2017). The positive discrimination or affirmative action was also said to have led to a "brain drain", since many of the previously highly skilled – and mostly white – researchers have left the country after transition (Interview S8, 28.02.2017).

Stakeholders from the field of trade and investment, in particular, expressed frustration because they felt that many policy-makers did not understand the logic behind basic economic concepts: "When you teach a rather high-ranking government official and they don't understand how the market operates […], then you can't really come to a more advanced topic […]." (Interview U22, 22.02.2017). Political decision-makers would have to do a lot of reading in order to understand the underlying economic models or the

consequences of policies, opinions went. Yet, due to the lack of time, they were forced to read the summaries of longer economic analysis reports (Interview P6, 22.03.2017).

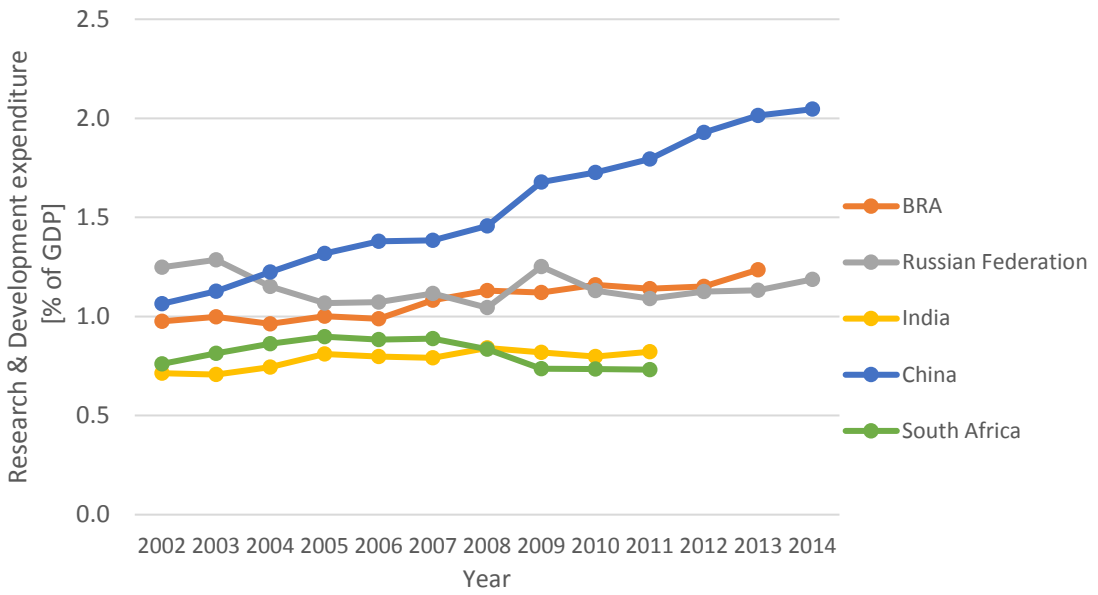
This "vicious circle" has kept policy-makers from fully grasping the underlying processes. The statements on limitations on the policy-makers' side were quite unequivocally and persistently expressed, and indicate a fundamental skills shortage in South Africa. It has to be stated, though, that this is a policy area with high ideological polarisation. Furthermore, the identified limitation was apparently not matched by, nor did it lead to, substantial investment in enhancing skills or explaining complex issues.

International actors engage with dedicated scholarship and academic exchange programmes. These programmes, aimed at high performers or those with high potential, might work as incentives for a greater number of people than those who ultimately benefit from the programmes. With these instruments, however, international actors cannot solve the more fundamental issues, such as deficits in planning (in teacher training and school building), in labour settings for schoolteachers, or with regard to the demographic challenge that South Africa is facing.

4.2.4 Underfunded research sector

The majority of interviewees emphasised that South Africa had all the basic institutions and framework to accomplish their work and to foster a fruitful interaction between research and policy-making. Yet, many actors of various institutions lamented a lack of funding that kept them and their institutions from fulfilling their tasks in a satisfying way. Compared to other developing countries, but also compared to other BRICS countries, and specifically in the light of ambitious government plans for a "knowledge-based society", as stated in the National Development Plan, the government's share of research expenditures in percentage of the Gross Domestic Product (GDP) is very low (currently 0.76% of GDP) (World Bank, 2017b). A possible reason for the low research budget – besides merely "wrong" prioritisation – might be that South Africa still faces many so-called "development country challenges" (e.g. very high levels of poverty and unemployment), which take up most of the government's attention. Researchers and policy-makers both expressed the pessimistic view that research was the first sector where funding was reduced if the need arose (Interview P2, 14.02.2017).

Figure 3: Research & Development expenditure of the BRICS countries



Source: World Bank (2017b)

Researchers amongst the interviewees for this paper complained that what was officially considered as "core funding" usually covered only the basic necessities: salaries. The actual research and any other activities were, according to them, not sufficiently covered (Interview A2, 17.03.2017). Many institutions are thus under-funded. They are faced with increases both in numbers of students and demands for maintaining high (quality) output in research, while funding stagnates or even decreases. As a result, they must become creative and acquire money from other sources such as international funds. Funding not only seems to be lacking on the research side. Policy-makers also mentioned that ministries are limited in their ability to have any societal impact as they are bound to certain (financial) regulations and targets (such as the National Development Plan) (Interview P8, 03.03.2017).

There appears to be a certain degree of resentment between different actors and institutions due to the uneven distribution of money. This has negative consequences for the willingness to cooperate across institutions, let alone different actor groups engaged in the research–policy interface. Besides academia, the national government agencies and research councils receive most of DST's research budget. Over the past years, however, government has reduced these proportions, making these bodies much more dependent on external funding (Interview A15, 15.03.2017). NGOs and other interest groups that receive project funding from international donors or development banks are also facing diminishing research budgets, as international actors are reducing their engagement in South Africa (Interviews I5, 14.03.2017; I6, 28.02.2017). A great disadvantage of international funding, mentioned by a university academic, was the temporal limitation of project funding. The period with secure funding from international sources was often too short and the interview implied that long-term research was rarely possible (Interview U6, 15.03.2017).

5 Conclusions and recommendations

South Africa features an impressive range of knowledge institutions. Highly ranked universities and think tanks operate in the country, as well as specialised government institutions, which operate with the mandate to inform the policy process in the executive and in parliament. Policy-makers (and planning documents) speak of the need for a knowledge-based society and economy. Furthermore, some elements are established to improve the science–policy interface, e.g. in DEA as a government department. This does not, obviously, mean that evidence and researchers automatically determine policy content. Debate, however, is lively about how much evidence *is* used to inform policies, or whether consulting researchers is a mere procedural fig-leaf. While this debate is generic to any interface between research and policy-making, some of the acrimony in the debate, and some political conditions, are very specific to South Africa.

The South African society and economy continue to be characterised by high inequality. The equality levels are, to some extent, typical of rising powers of the Global South. In rising powers, inequalities are due to unequal growth, with (privileged) parts of the population gaining access to capital and higher income more rapidly than others. Some of the increase in national wealth in these rising powers can be expected to have a positive effect on research capacities and knowledge creation in rising powers. An increase in knowledge capacities often requires substantial structural change to overcome developmental bottlenecks and, as discussed in economics, to overcome the poverty trap and foster broad-based knowledge in societies. In South Africa, historical privilege has been (and, effectively, continues to be) racially determined. Even though, in many aspects, the country has successfully managed to present itself as a rising power, unemployment and poverty are still widespread, and questions about a sustainable and inclusive development and growth grow louder in society. In some areas, the quest of (international) prestige was regarded as an additional motivation, with a negative impact on the research–policy interface: South Africa aspires to international recognition as a rising power, and would like to paint itself as technologically advanced and with sound expertise in natural sciences such as engineering and astronomy. If the broad value to society of these endeavours is not communicated well, these prestige projects risk being regarded as costly "white elephants" of science. Science's dialogue with society is thus particularly required in South Africa, even if this places, de facto, additional strain on the limited (time) resources of academics. The "ivory tower" is a forbidding image in the South African context, both with regard to the resource (ivory) and to the allusion to colour (white); neither is it a viable option.

South Africa looks back on a violent and complex past, still facing diverse challenges. This is also and especially true when it comes to the interaction of research and policy-making and the conditions of their interactions. The South African framework offers some excellent institutions, and thus existing capabilities in research and administration in the country. Yet, even in pluralist and democratic South Africa 20 years after the first multi-racial elections, the education and research sector as a whole remains structurally underfunded and highly unequal; it still fails to service large parts of the population. Economic and social effects take much longer to change than the political regime, and this leads to broader repercussions for the research system in South Africa, and impacts on the setting in which external partners engage.

The following section concludes this paper. The central issues identified in the course of this study are highlighted and presented as recommendations.

5.1 Finance – government's own goals on research and development

According to the official report *Estimates of National Expenditure 2016*, published by the National Treasury, South Africa aims "to increase high-quality outputs produced by the national research system". This will allow South Africa to compete for increasingly mobile talent and coveted international research and development funding. It will also improve the country's position in global innovation value chains, which is a way of addressing both low growth rates and pressing social and environmental problems (National Treasury, 2017, p. 535/536). Even though the government's expenditures on research and development have increased over the past decades and are planned to be increased further during the next few years, they currently only account for about 0.76% of the GDP. Compared to other middle-income countries, and compared to the other BRICS states in particular, this number is relatively low (World Bank, 2017b). It is even more startling when considering the far-reaching ambitions formulated by the South African government in creating a "knowledge-based society".

If South Africa wants to do justice to its claim of being a progressive science nation that strives for scientific excellence, eye-level cooperation and taking over a leading role on the African continent, government must support its own national researchers with sufficient financial means. According to the National Treasury report, government has set the target of raising gross expenditure on research and development to 1.5% of GDP by 2019 (National Treasury, 2017, p. 535/536). This sounds like a very ambitious but reasonable step in the right direction and would by far surpass the goal of the African Union to increase expenditure to 1% throughout all African nations (BMBF, 2014, p. 9). Additionally, topped-up investment in research will also benefit national development in socioeconomic terms in the long run.

South Africa's status as a transitory country has increasingly led to donors' withdrawal from the country. Classical development cooperation with a traditional "donor and recipient" mentality is not suitable for countries like South Africa anymore. However, there are new forms of cooperation, such as science cooperation, that could replace the traditional ones and be of mutual benefit for both South Africa and its partner countries. A turn towards science cooperation would allow South Africa to maintain its external financial support, but to adapt it to its evolving needs as a nation with growing scientific expertise and with remaining inequalities and inner-societal challenges.

5.2 Interaction – where to adjust the incentives

As has been mentioned by a multitude of interviewees from the research side, the incentive to engage with policy-makers or even produce products specifically designed for them – such as policy-relevant short papers – is relatively low in South Africa. Researchers, especially university scholars, are under constant pressure to produce scientific outputs for high-ranking journals in order to meet the requests of their employers, and to receive the highest possible ranking of the NRF. According to the NRF, this "rating of individuals is

based primarily on the quality *and impact* of their research outputs" (NRF, 2017, emphasis added). Yet, this appears to relate rather to impact factors of journals (i.e. publications), and does not take into consideration the production of policy-relevant documents or the interaction with policy-makers.

What is missing in the NRF's explanation is, firstly, how exactly the impact of research outputs is measured and, secondly, the role that should be played by the degree of applicability and policy relevance of the findings. In order to sharpen the incentives for researchers to produce academically reviewed journal articles *and* to foster interactions with policy-makers, the rating system of the NRF should include applicability as a fixed component. If researchers had to consider policy relevance within their written outputs and, for example, provide their narrative for impact, as is done in the United Kingdom's Research Excellence Framework, this could add a new dynamic to the system. On the one hand, researchers willing to engage with policy-makers would benefit as they could include policy-oriented publications in their spectrum of outputs without fear of being down-rated. Government officials, on the other hand, would potentially benefit by receiving more products that take into consideration, or are even directly tailored to, their needs.

International cooperation partners of South Africa could also contribute to a higher appreciation of policy-relevant outputs. They have the capacity to increase incentives for applicability of research outputs by incorporating this as a requirement in their cooperation as well as in funding guidelines. If international science cooperation partners and international donors in general made policy relevance a criterion for their funding, this could boost the interaction between research and policy-making, and intensify science cooperation impact.

5.3 Co-creation of research – sharing knowledge and building trust

In order to enhance and standardise the communication between researchers and policy-makers, stakeholders should strive for co-creation of research processes, especially when they engage in commissioned studies. There are positive endeavours by ministries such as the DEA to foster co-creation of knowledge (see Chapter 3). If the involved actors meet and exchange ideas regularly from the beginning of the process onwards, including finding relevant questions to be researched, they get the chance to express their expectations of the project and of the other parties at a very early stage. Regular personal contact and intense communication of expectations and feedback allows for trust-building between the actors and helps to prevent misunderstandings. The often-mentioned lack of respect for the other group is likely to diminish if researchers and/or consultants interact more regularly and more intensely with policy-makers and thereby get to understand them better.

Since many researchers critically stated that the ToR of commissioned studies are often misleading or ambiguous, a suggestion for these actors would be to co-produce or co-design the ToR together with policy-makers. Additionally, standardised guidelines for ToR containing all aspects that are generally of interest for the contracted researcher would help to remind policy-makers of what researchers need and vice versa. Through the co-creation of research processes, the lack of feedback that many researchers lamented could also be addressed. Feedback is important because it indicates what went well in the interaction and where there is room for improvement. Researchers need feedback from policy-makers in order to deliver more precise, tailored, and therefore more relevant, inputs to ministerial

staff. Policy-makers need feedback on how concise the ToR were for the researchers in order to formulate them more adequately in the next study. If researchers and policy-makers work closely together right from the beginning of the project, they can communicate their expectations to each other before, during and after the project, thereby reassuring each other of their respective roles in the process, which helps, inter alia, to keep the question of legitimacy in the conversation.

5.4 Training – investing in researchers, policy-makers and university students

The interviews showed that both researchers and policy-makers could improve the intensity, channels and form of communication. Therefore, tailored trainings could be offered within government departments and separate trainings within research institutions, NGOs and consultancies.

An exercise for inclusion in these voluntary training courses for researchers could be the production of target-group friendly and concise policy-relevant outputs such as policy briefs. Additionally, researchers could be trained on how better to understand the political process and the "policy cycle". This might help them to identify suitable entry points for interaction and to insert their inputs exactly at the point in the policy formulation or evaluation process when policy-makers need them most. It can thus be said that these trainings for researchers might help them to anticipate the agendas of policy-makers and to look out for so-called "windows of opportunity" (Cairney & Jones, 2016, pp. 39-40) where demand for scientific inputs is high.

Voluntary trainings for interested government officials could involve short workshops or seminars transmitting a better understanding of scientific contents relevant for the working area of the respective official. This could contribute to enhancing their scientific understanding of the topic, and could be of use when these policy-makers interact with researchers working on the same topic. The frequent use of technical terms and scientific jargon that leads to a lot of frustration, according to the interviews, would be less dissatisfying if policy-makers were trained on the topic. A second idea would be to give interested government officials the opportunity to attend longer-term trainings, for example in the form of evening courses. These could convey similar contents to the shorter-term workshops or seminars mentioned above. Due to the longer time period, these courses carry the option of going into more detail than the one- or two-day workshops. They would be more of a long-term investment for government departments in their staff's capacity to interpret and process scientific inputs and deliverables.

5.5 Networks – creating opportunities for junior researchers and policy-makers

Personal relationships and contacts seem to be a decisive factor for the success of the interaction between researchers and policy-makers in South Africa. Junior staff, with little working experience, find it especially difficult to get access to policy-makers, since they do not possess many personal contacts and networks. International or transnational networks might further contribute to overcoming the limitations of junior researchers.

The establishment of institutionalised forums and networks could help to connect junior researchers with ministerial staff. This could either be achieved by using senior researchers who are already well connected with government as facilitators or connectors. Alternatively, the institutions themselves could initiate these forums and make use of their reputation and past successes regarding interaction. Young researchers, who have recently graduated from university, or who are still students, could register in a "junior researchers' database", administered by their university or by a government agency. Once they are registered, they would receive access to mailing lists of interested government officials as well as to detailed lists containing information on who in the ministries is responsible for which topics. Through this information, the researchers would be able to better assess to whom they should distribute their scientific findings. On the other side, policy-makers who are part of these networks could get regularly updated lists providing information on who in the university works on which topic.

The above-described networks and the databases could thereby help to resolve the problem that both researchers and policy-makers often do not know whom to address on "the other side". Closing this knowledge gap could help to achieve a more targeted policy advice system whereby researchers are aware of their ideal target groups or addressees. They could distribute the findings to those peers in government who might benefit from them most and who are therefore most receptive.

In addition to the networks, universities and government departments could work together to give students the opportunity to do internships in government. Young professionals working in the research sphere could be seconded to ministries. This would help them to acquire practical skills and better understand the government's institutional setting, motivation and constraints.

5.6 Knowledge brokers – a viable bridge across the gap?

Since researchers and policy-makers speak different types of languages and pursue diverging objectives, a translation needs to take place to ensure smooth, regular and unambiguous communication between the two spheres. An idea discussed in South Africa is the creation of knowledge-broker positions or units, responsible for translating, mediating and facilitating between researchers and policy-makers.

Ideally, these knowledge brokers would be individuals with working experience in both spheres, who therefore understand both perspectives and their respective needs and constraints. One possibility would be to establish knowledge-broker units within institutions that engage with each other in policy advice. A positive example of an already existing knowledge-broker unit within a research and policy institution is the science-policy unit in the DEA. Stellenbosch University, for its part, makes efforts to summarise academic work in order to make it "digestible" for a wider, non-scientific audience (Interview U5, 22.03.2017); this, however, is rather the communication of research results than an in-depth engagement with decision-makers. In South Africa, research councils and other agencies are already partially mandated to fill the role of knowledge brokers and this could be further developed. Knowledge brokers were thought to focus on the collection, shortening, translation and processing of scientific findings. They should not be expected to conduct genuine research themselves. In the ideal scenario, they would thereby avoid the role

conflict faced by some government agencies, torn between eternal demand for policy advice and the expectation to conduct research. An additional challenge is an inbuilt tendency to subjectivity and consequently suspicion towards individuals who, de facto, would be gate-keepers between academia and the policy sphere.

This model, however, risks being short-sighted and of generating actors who become increasingly out of touch with the latest research and advances in methodology, thereby substantially decreasing their value in their designated role. Many interviewed staff already regarded themselves as knowledge brokers, but were unsatisfied with the conditions of their role. Ultimately, it seems more promising to further develop the role of research councils, agencies and think tanks, for instance, by including policy work in assessment frameworks and incentive schemes.

These recommendations and suggestions should serve as stimuli for a discussion around possible starting points for South African as well as international actors who want to strengthen the already existing science–policy interface in South Africa. After their research, the authors are more than ever convinced that there is a high potential for evidence-informed policy advice in the country, which could be further advanced by identifying, clustering, addressing and mitigating – and in some cases overcoming – still-existent tensions.

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