Advancing Scholarship: Serving Society

Scientific thought and activity enrich us profoundly; they empower us to understand and to shape our living environment

Constitution, ASSAf

ASSAf Celebrates 20 Years of Excellence 1996 – 2016

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

Celebrating 20 years
(1996 - 2016)
in the service of society

ASSAf
ACADEMY OF SCIENCE OF SOUTH AFRICA

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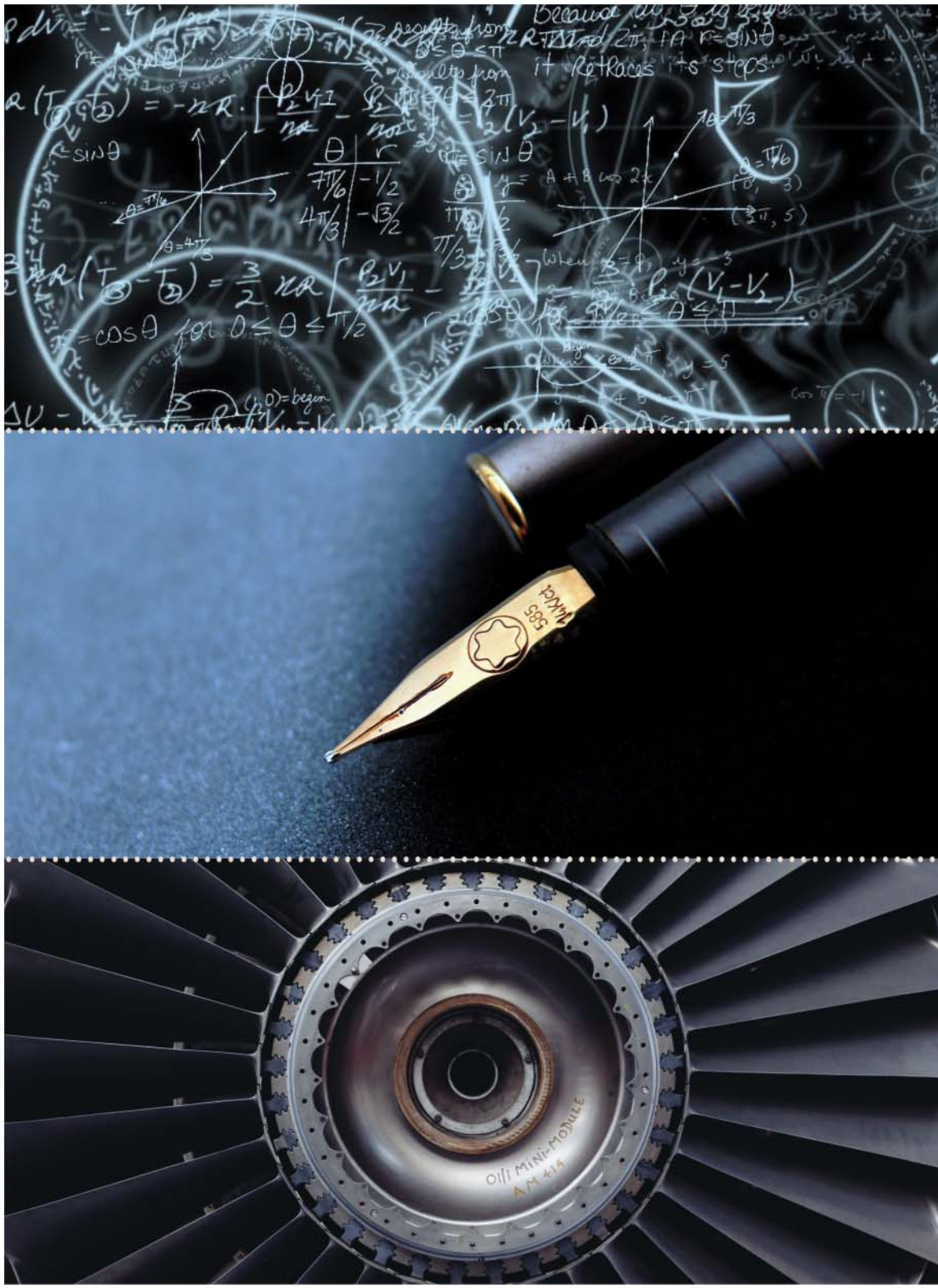
The Academy of Science of South Africa (ASSAf) was inaugurated in May 1996. It was formed in response to the need for an Academy of Science consonant with the dawn of democracy in South Africa: activist in its mission of using science and scholarship for the benefit of society, with a mandate encompassing all scholarly disciplines that use an open-minded and evidence-based approach to build knowledge. ASSAf thus adopted in its name the term 'science' in the singular as reflecting a common way of enquiring rather than an aggregation of different disciplines. Its Members are elected on the basis of a combination of two principal criteria, academic excellence and significant contributions to society.

The Parliament of South Africa passed the Academy of Science of South Africa Act (*Act 67 of 2001*), which came into force on 15 May 2002. This made ASSAf the only academy of science in South Africa officially recognised by government and representing the country in the international community of science academies and elsewhere.

Advancing Scholarship: Serving Society

ASSAf Celebrates 20 Years of Excellence

1996-2016


because
it Retraces its steps.
585
MINI-MODULE

DEFINITION OF A SCIENCE ACADEMY

Academies of science, medicine and engineering can be found in most of the world's countries. They are typically independent, self-perpetuating national institutions that recognise excellence and achievement. Academies are merit-based, with members selected from among the leading scientific, medical and engineering minds within a country. (Partnership, n.d.)

Sir Michael Francis Atiyah, brilliant mathematician and one of the founders of the first global network of science academies, the InterAcademy Panel (IAP), believes it is the role of a science academy:

- to provide independent critique and ideas;
- to relate to the government of the day, but to remain independent of it;
- to relate to the public; and
- to establish interdisciplinary links; and he adds
- a science academy is not a 'trade union' for scientists.

Many models of national science academies exist, ranging from those that have only an honorific function to those that have both an honorific and a science advisory role, to those that include under the academy umbrella, a range of research institutes engaged in primary research. The Academy of Science of South Africa (ASSAf) has adopted the 'working Academy model', similar to that of the Royal Society (London) and the United States (US) National Academies, widely regarded as the international leaders and the 'gold standard' in combining the honorific and science advisory functions. Their impartial and respected voices carry weight in government circles and it is such academies that ASSAf aims to emulate.

VISION

The Academy of Science of South Africa (ASSAf) aspires to be the apex organisation for science and scholarship in South Africa, recognised and connected both nationally and internationally. Through its Membership, which represents the collective voice of the most active scholars in all fields of scholarly enquiry, ASSAf aims to generate evidence-based solutions to national problems.

MISSION

The mission of the Academy is to:

- recognise scholarly achievement and excellence in the application of scientific thinking for the benefit of society;
- mobilise Members to ensure that they are available to contribute their expertise in the service of society;
- conduct systematic and evidence-based studies on issues of national importance, producing authoritative reports that have significant impact on policymaking;
- promote the development of an indigenous system of South African research publications, increasing their quality, visibility, accessibility and impact;
- publish science-focused periodicals that will showcase the best of southern African research to a wide national and international audience;
- develop productive partnerships with national, regional and international organisations with a view to building our capacity in science and its application within the National System of Innovation (NSI);
- create diversified sources of funding for sustainable functioning and growth of a national academy;
- communicate effectively with relevant stakeholders through various media and fora.

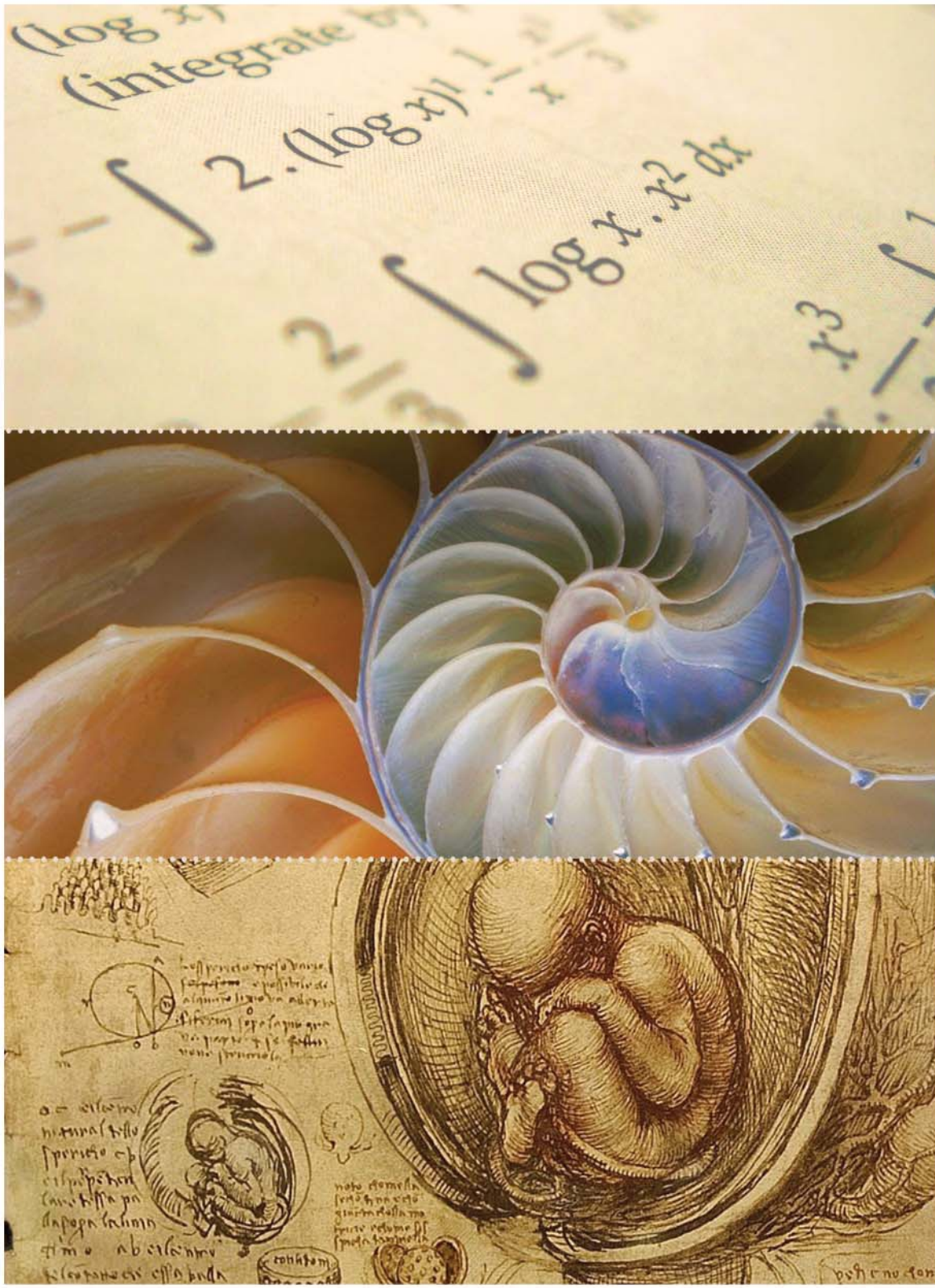
HISTORICAL TIMELINE

1908	1909	1942	1986	1989	1991
Royal Society of SA founded	Akademie vir Wetenskap en Kuns founded	Akademie renamed Suid-Afrikaanse Akademie vir Wetenskap en Kuns	Science and Engineering Academy of South Africa founded	First planning meeting to discuss establishing a national academy of science	Planning committee hands over to facilitating committee to prepare for new academy

2005	2006	2007	2008	2009	2010
ASSAf resource centre opens	First major consensus was released Report on a Strategic Approach to Research Publishing in South Africa	Landmark consensus report on HIV/AIDS, TB and Nutrition released NSEF established	Scholarly Publishing Programme Launched New editorial model for SAJS	Launch of the newly certified SciELO SA open access platform for scholarly journals ASSAf hosts OWSD SA ASSAf hosts TWAS scientific conference and General Assembly	ASSAf elected as President of NASAC ASSAf hosts 6th ASADI meeting

1994	1995	1996	2001	2002	2004
Announcement and draft constitution for a new academy	100 Founder Members elected	Launch of ASSAf	ASSAf Act (Act 67 of 2001) passed by SA Parliament, ASSAf becomes de facto science academy First consensus study on research publishing begins Founder member of NASAC	Elected to board of IAC Assumes responsibility for publication of SAJS	ASADI announced and generous funding and mentoring Launch of popular science magazine Quest

2011	2012	2013	2014	2015	2016
ASSAf begins functioning independently of ASADI SAYAS launched and 20 founding members elected	SAYAS hosts GYA General Assembly and Scientific Conference	ASSAf hosts IAMP Scientific Conference and General Assembly	ASSAf awarded bid as focal point of GenderInSITE Southern Africa African-conceived and driven ASADA launched representing academies on continent	ASSAf consensus report on gender orientation in Africa praised in lead editorial in Nature	South Africa hosts IAP Conference on Science Advice and General Assembly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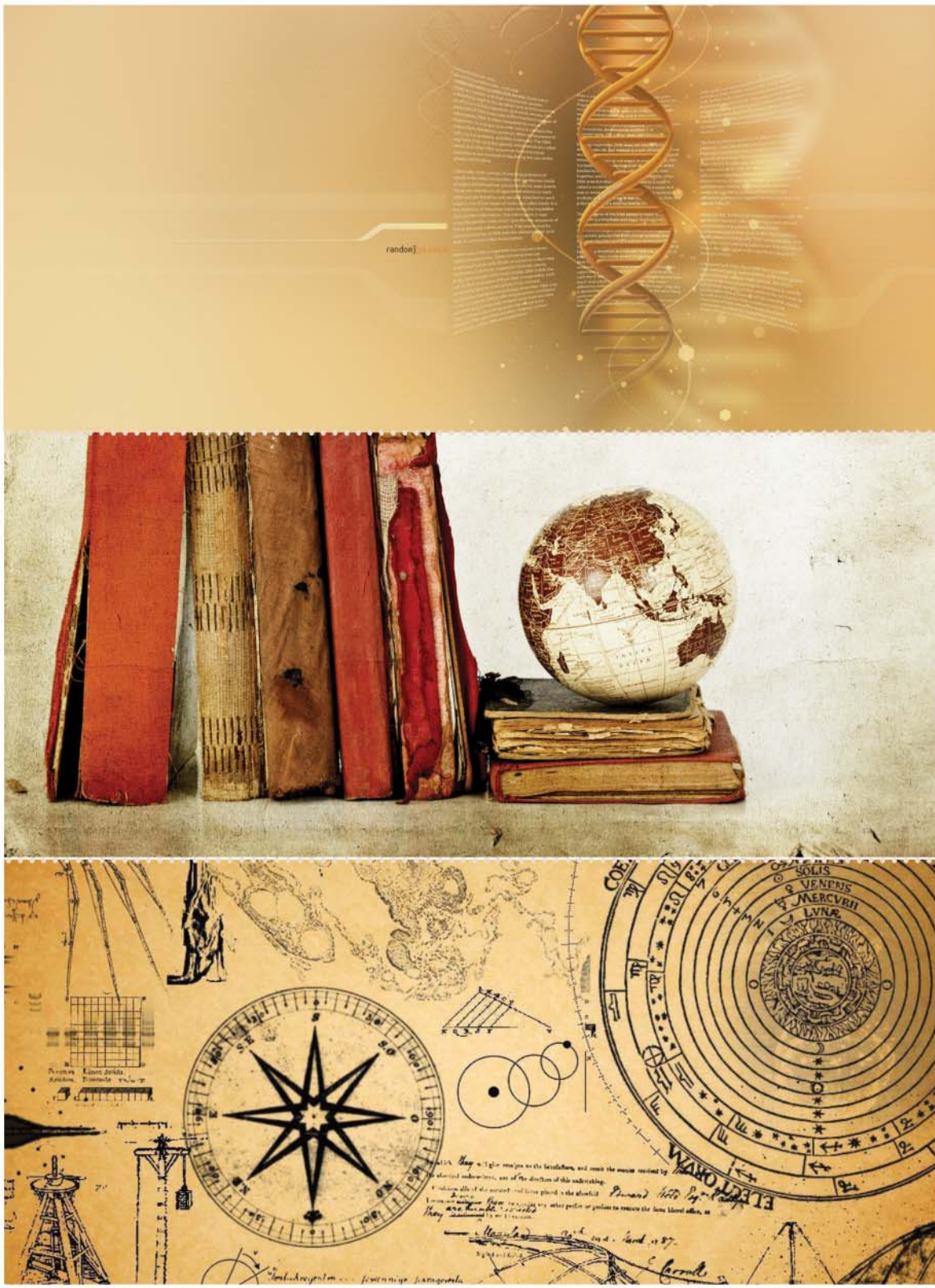
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ELECTRICITY

ACRONYMS AND ABBREVIATIONS

AAS	African Academy of Sciences
AEC	Atomic Energy Corporation
AET	Agricultural Education and Training
AIDS	Acquired Immune Deficiency Syndrome
ANC	African National Congress
ARC	Agricultural Research Council
ASADA	Africa's Science Academy Development Agenda
ASADI	African Science Academies Development Initiative
ASSAf	Academy of Science of South Africa
AU	African Union
BMBF	German Federal Ministry of Education and Research
BRICS	Brazil, Russia, India, China and South Africa
BSP	Bureau for Scientific Publications
CHE	Council on Higher Education
CODESA	Convention for a Democratic South Africa
COSATU	Congress of South African Trade Unions
CSIR	Council for Scientific and Industrial Research
CSPiSA	Committee on Scholarly Publishing in South Africa
DACST	Department of Arts, Culture, Science and Technology
DANIDA	Danish International Development Agency
DHET	Department of Higher Education and Training
DST	Department of Science and Technology
FEST	Foundation for Education, Science and Technology (later SAASTA)
FRD	Foundation for Research Development
GenderInSITE	Gender in Science, Innovation, Technology and Engineering
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GYA	Global Young Academy
HIV	Human immunodeficiency virus
HSRC	Human Sciences Research Council
GMOs	Genetically modified organisms
IAC	InterAcademy Council
IAMP	InterAcademy Medical Panel
IAP	InterAcademy Partnership
IAP	The Global Network of Science Academies
IBSE	Inquiry-based Science Education
ICSU	International Council for Science
ICSU ROA	International Council for Science Regional Office for Africa
ICT	Information and communications technology
IOM	United States Institute of Medicine
M&E	Monitoring and evaluation
MoU	Memorandum of understanding
MRC	Medical Research Council
NACI	National Advisory Council on Innovation

NAS	Nigerian Academy of Science
NASAC	Network of African Science Academies
NDP	National Development Plan
NEPAD	New Partnership for Africa's Development
NRF	National Research Foundation
NSBPF	National Scholarly Book Publishers' Forum
NSEF	National Scholarly Editors' Forum
NSI	National System of Innovation
NSTF	National Science and Technology Forum
OWSD	Organisation for Women in Science for the Developing World
OWSD SA	South African National Chapter of the Organisation for Women in Science for the Developing World
PAU	Pan-African University
PFMA	Public Finance Management Act
RSSAf	Royal Society of South Africa
SAAE	South African Academy of Engineering
SAASTA	South African Agency for Science and Technology Advancement
SAAWEK	Suid-Afrikaanse Akademie vir Wetenskap en Kuns (pre-2004)
SAAWK	Suid-Afrikaanse Akademie vir Wetenskap en Kuns (post-2004)
SAC	Scientific Advisory Council
SADC	Southern African Development Community
SAJS	South African Journal of Science
SAWISE	South African Women in Science and Engineering
SAYAS	South African Young Academy of Science
SciELO	Scientific Electronic Library Online
SciELO SA	Scientific Electronic Library Online South Africa
SDGs	Sustainable Development Goals
SEASA	Science and Engineering Academy of South Africa
SKA	Square Kilometre Array
S&T	Science and technology
SPP	Scholarly Publishing Programme
SPU	Scholarly Publishing Unit
STEM	Science, technology, engineering and mathematics
STG	Science and Technology Group
STI	Science and Technology Initiative
STISA	Science, Technology and Innovation Strategy for Africa
TB	Tuberculosis
TWAS	The World Academy of Sciences
TWAS-ROSSA	TWAS Regional Office for Sub-Saharan Africa
UCT	University of Cape Town
UN	United Nations
UNCSTD	United Nations Commission on Science and Technology for Development
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UP	University of Pretoria
USAID	United States Agency for International Development
US NAS	United States National Academy of Sciences
WEF	World Economic Forum

ACKNOWLEDGEMENTS

Many people have contributed to the production of this book which documents ASSAf's early history.

- Foremost on the list of those to acknowledge are those who played a critical role in the founding of the Academy. These include Prof Wieland Gevers, Dr Reinhard Arndt, Prof William Makgoba and Prof Iqbal Parker. Each of them gave of their time generously, sharing anecdotes and memories that have enriched the content of this book. Prof Gevers is particularly thanked for drafting major sections of the text.
- Minister Pandor for her unstinting support of ASSAf and her science leadership.
- All the people who were interviewed, too many to name, who contributed stories and material.
- The staff of the Academy for sharing relevant documents and particularly Dr Xola Mati for sourcing most of the documents from the early history.
- Dr Xola Mati and Ms Patricia Scholtz of ASSAf for steering the book through the various stages, from conceptualisation to final production. Ms Scholtz in particular is thanked for her copy editing and design.
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FOREWORD

> Science has always been an integral part of the fabric of South African society but it has been characterised by enormous racial and gender disparities, some of which were the result of deliberate policy, and others which have not yet been fully addressed. The launch of the Academy of Science of South Africa (ASSAf) in 1996 was one step towards addressing the inequities in human capital and South Africa's significant isolation from the global science system.

The pursuit of knowledge is the foundation of science, technology and innovation systems. Interaction in the science system gives rise to knowledge accumulation and collaboration among the actors and contributes to fundamental and multidisciplinary innovation. A national academy of science plays a key role in facilitating these interactions as a shared national asset.

FOREWORD

The role of the Academy is first, to promote and inspire outstanding achievements in all fields of scientific enquiry and to grant recognition for excellence and, second, to undertake studies on matters of public interest with a view to providing evidence-based science advice to government and other stakeholders. During its 20-year existence, ASSAf has made great strides in this regard. It has built a robust academic reputation. This is evident in the valuable and diverse studies which have been undertaken to enhance science in South Africa and to support evidence-based policymaking. In this way, ASSAf helps provide a foundation upon which to build a National System of Innovation (NSI) that will drive inclusive and sustainable growth and development, and increase South Africa's global competitiveness.

ASSAf should be commended too for its active role in strengthening science academies in Africa. Although African investment in science research is growing, we are lagging behind in terms of our contribution to global investment in research and development. We need to nurture African science collaboration to boost both investment in, and the performance of, science on the continent. I am hopeful that ASSAf will continue to support the growing recognition of the fundamental role that science can play in inclusive development on the continent, and the role that these academies will play in improving African science collaboration.

I am particularly pleased at the establishment of the South African Young Academy of Science (SAYAS), which has played a valuable role in helping to build a young cohort of distinguished scientists in the country and in providing a platform for the voice of young scientists to be heard.

My department encourages ASSAF to take the next steps in the ongoing transformation of its Membership to ensure that black scientists and women are increasingly represented. All players in the science system need to contribute towards expanding the pool of young people taking science subjects at school, completing postgraduate degrees and contributing towards the building of our National System of Innovation.

It gives me great pleasure to congratulate ASSAf on its 20-year celebration and to thank the Academy for its contribution towards helping my department address the triple challenges set out in the National Development Plan (NDP) and thereby enhance the quality of life of all South Africans.

Naledi Pandor
Minister of Science and Technology

PREFACE

Science has a central role in our **future,** particularly in the process of transforming South Africa socially, environmentally and economically

This year we celebrate the Academy of Science of South Africa's 20th year of existence.

We owe a great debt of gratitude to those of our colleagues whose wisdom and resolve have been instrumental in realising the dream of a representative, *de facto* national academy of science to guide the democratic South Africa into a promising new era. The Founder Members dedicated themselves to bringing together disparate parties to draft a constitution for the Academy, and to put in place the mechanisms, statutes and machinery needed to run a modern, working national academy of science.

Since its inception, ASSAf has grown remarkably from a small, emergent organisation to a well-established body. The dual mandate of the Academy is, first, to promote and inspire outstanding achievements in all fields of scientific enquiry and to grant recognition for excellence; and second, both on request and at its own initiative to undertake studies on

PREFACE

matters of public interest in order to provide evidence-based scientific advice to government and other stakeholders.

Particularly since it became a statutory body in 2002, the Academy has steadily and resolutely pursued its science advice mandate in support of policy development on issues of national significance to government and beyond. In recent years there has been a sharpening of the understanding of this role, and of the place of the Academy in relation to other bodies that provide science advice.

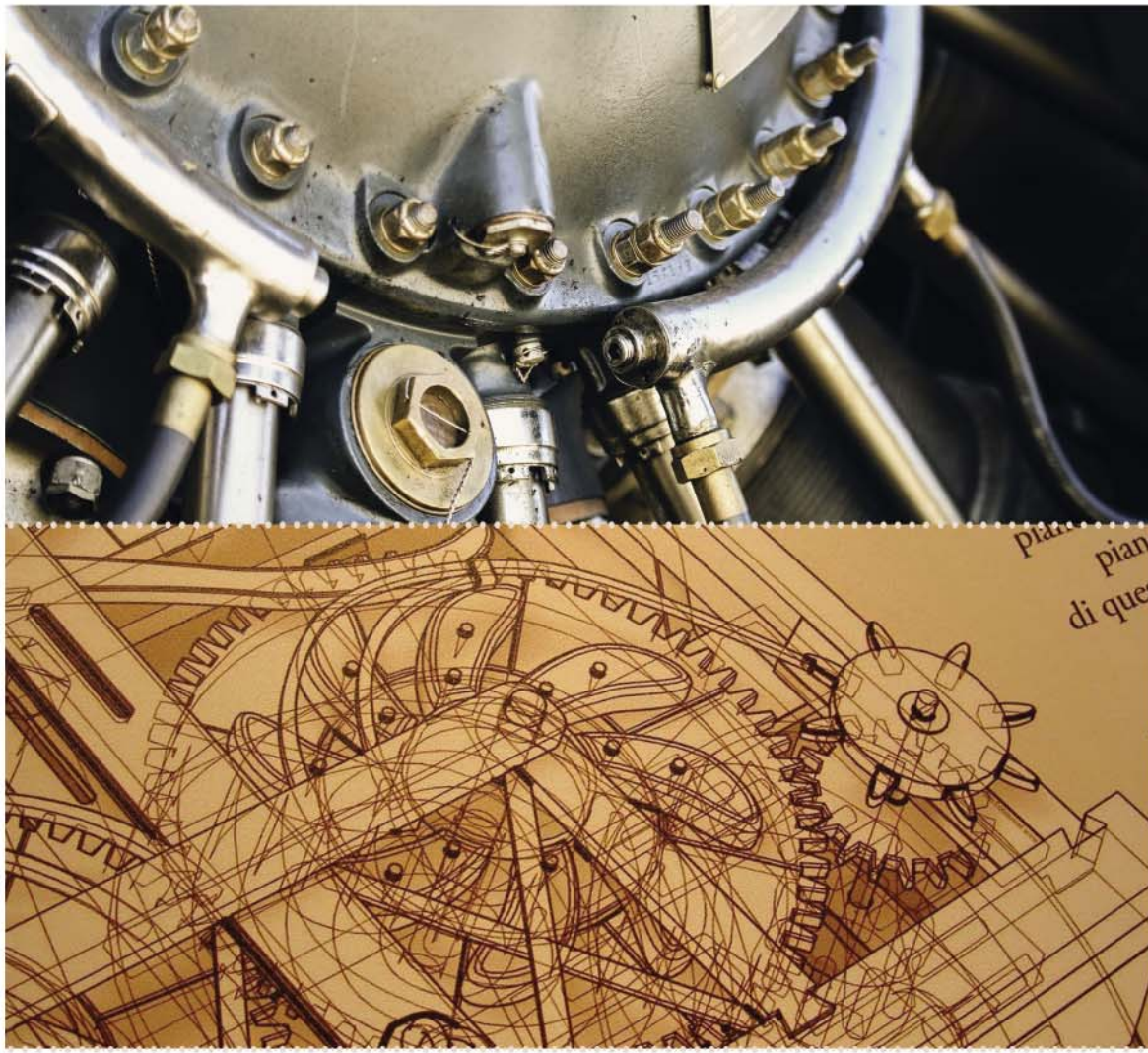
Today the Academy is able to call on a substantial pool of experts, from a broad scholarly range, to provide independent advice that is free of vested interests. In addition to initiating activities such as assessment studies and specialist workshops, ASSAf receives and responds to an increasing number of requests to conduct evidence-based studies that would inform policymakers.

Science has a central role in our future, particularly in the process of transforming South Africa socially, environmentally and economically. In this regard the Academy recognises the high priority that the national strategic challenges presented by poverty, inequality and unemployment must enjoy in its plans, strategies, and activities. Equally important is the objective of promoting the public understanding of science, so that we have a citizenry that is able to appreciate the beauty of science, its place in our cultures, and its central role in our development as a country.

ASSAf continues to play a significant role in activities at the continental and global levels, and represents South Africa on bodies at these levels. Through NASAC, the Network of African Science Academies, ASSAf has been a leading contributor to the development of Africa's Science Academy Development Agenda (ASADA). This and related collective efforts provide avenues through which ASSAf works with its partners towards the development of academies on the continent, and our capacity to provide advice.

The chapters that follow convey something of the scope and depth of the Academy's work, and will, I hope, emphasise the importance of this work in our national development and in our interactions at international level. Equally, this work provides some insight into the remarkable achievements of our scientific community.

Prof Daya Reddy
President: Academy of Science of South Africa



Scientific thought and activity enrich us profoundly

Constitution ASSAf

INTRODUCTION

The Academy of Science of South Africa (ASSAf) was inaugurated in May 1996 in the presence of then-President Nelson Mandela, named patron of the body. It was formed in response to the need for an academy of science consonant with the dawn of democracy in South Africa: activist in its mission of using science for the benefit of society and with a mandate encompassing all fields of scientific enquiry in a seamless way, and including in its ranks the full diversity of South Africa's distinguished scientists.

> *Scientific thought and activity enrich us profoundly; they empower us to understand and to shape our living environment; they are keys that can open the doors to a peaceful and prosperous future. The function of science is to create in a disciplined and systematic way, a continuum of coherent, rational and universally valid insights into observable reality in all its various facets. Scientific thinking and knowledge are fundamental to the best work done in the applied natural sciences and in technology, and this applies also to much of the human and social sciences.*
>
> *An Academy, which effectively harnesses the minds and energies of the most able practitioners of scientific thought, reflects, as almost nothing else does, the strong bonds between scientific disciplines and the unique character of the scientific contribution to the lives of all citizens. The Academy of Science of South Africa is constituted to ensure that leading scientists, acting in concert and across all disciplines, can promote the advancement of science and technology, can provide effective advice and can facilitate appropriate action in relation to the collective needs, threats, opportunities, and challenges of all South Africans." – Preamble to the Constitution of the Academy of Science of South Africa, 1996*

The story of South African science and scholarship, at the emergence of our celebrated democracy – and as seen through the lens of ASSAf – is one of an institution forged in the unique crucible that was a country wrestling with its tumultuous and divided past, while trying to blaze a trail of cooperation and progress.

The World Academy of Sciences (TWAS) notes that science represents "an essential element of continuity for the nation... across the enormous gap separating the eras of apartheid and democracy". Today ASSAf is well-accepted in the international system of academies.

This book relates how the Academy has moved from those early days of promise, through its growing pains and funding constraints, into an era in which the 'machinery' of the academy was set up and warm bodies employed to operate the 'machinery'. It looks at how the framework for consensus studies was refined and approved, how the first studies were met with great applause and how ASSAf has matured into a fully functional, relevant and vibrant modern academy of science in 2016.

ASSAf's greatest achievements to date include the new strategic framework created for South Africa's research journals, establishing the *South African Journal of Science (SAJS)* as a 'national asset' of high quality; and ensuring that discoveries and insights gained through research published in South African journals are made known to a wider public than the research community itself.

A new academy that adopts and steadfastly maintains a fresh and contemporary approach to its mission within the core framework of practice can readily become a star performer. The argument will be made here that South Africa's national science academy has achieved this status, after only 20 years, despite having had to contend with many difficulties in its operating environment since its inception in 1996.

Many of the greatest names in South African science and scholarship were/are elected Members of ASSAf. Among the Gold Medal awardees alone are: a biologist and Nobel Laureate who helped decode DNA; an epidemiologist recognised for her groundbreaking research on HIV prevention in women; a social scientist who nudged and cajoled into place the campaign to understand and contain HIV/AIDS in South Africa; a leading maths education proponent; a human geneticist whose work helped to clarify the origins of indigenous groups in Africa; one of the world's leading theorists in cosmology, and a leading immunologist and physician who pioneered higher education transformation in South Africa… in sometimes controversial ways.

Since its inception, ASSAf has grown remarkably from a small, emergent organisation to a well-established academy. This honest account chronicles the Academy's successes and achievements. Finally, we look at lessons for the future.

Today, ASSAf's activities are grouped into strategic priorities:

- Recognition and reward of excellence.
- Promotion of innovation and scholarly activity.
- Promotion of effective, evidence-based scientific advice.
- Promotion of public interest in and awareness of science and science education.
- Promotion of national, regional and international linkages.

As a legislated Academy, ASSAf occupies a unique place in the science system in the country through its self-perpetuating, merit-based composition, its independence, and its commitment to the application of scientific thinking to address the problems of society. The Academy is a young organisation seeking to find its rightful, productive place in the science and technology system of South Africa. This book celebrates a young and agile science academy operating in the unique ontological hotspot that is South Africa in 2016.

The publication concludes **that ASSAf plays a niche role, is useful, and is here to stay**.

HISTORY

Part A: South Africa's First Unified Academy of Science Arises in an Interplay of Historical Forces

South Africa in the early 1990s was indeed a unique crucible of societal change. At the dawn of democracy, the country was wrestling with its past while trying to forge a future of cooperation and progress. Cast together by the forces of history, the politicians wrestled to draw up an interim Constitution for the new South Africa at the Convention for a Democratic South Africa (CODESA) talks in Kempton Park. (Sparks, 1994)

What is much less well-known is that the leaders of South Africa's science and scholarship community were simultaneously engaged in forming a new, unified academy of science for all South Africans. This chapter sketches the history that led to the launch of ASSAf and tells the story of these tumultuous and invigorating times.

South Africa's scientific community until that point had been divided between the white, Anglo-oriented Royal Society of South Africa (RSSAf); the white, Afrikaner *Suid-Afrikaanse Akademie vir Wetenskap en Kuns* (*SAAWK*) and more recently, the black Science and Engineering Academy of South Africa (SEASA).

The process to establish the national academy – ASSAf – took about five years and was aligned with the momentous events that led to the first democratic election in South Africa in 1994.

To finally move on and start something new, you must release the unchangeable **past** and embrace your **future**

Chapter 1: Early Beginnings in a Unique Crucible

The metaphor of a 'crucible' is appropriate for capturing the essence of the genesis of an institution in its historical setting. One meaning of the noun (*Oxford Advanced Learner's Dictionary*) is "a situation of severe trial, or in which different elements interact, leading to the creation of something new". This is indeed what is involved in the creation of a national science academy, with a multitude of different pressures and involvements from outside, acting powerfully or weakly at different times. The ultimate action is that of the constituents themselves forming something new, with a life and function of its own.

The reflection is relevant to the history of ASSAf because the metaphor of a crucible was used in the most important planning document relating to its genesis, and because its aptness has remained the case throughout subsequent developmental steps right up to the present. External forces of many kinds continue to act on the now well-established body, eliciting transformational responses within, and the 'life of its own' is always in unsteady equilibrium with its environment, striving to remain useful and increasingly so. (Gevers, 2015)

Two bodies aspiring to the same role for almost 100 years

South Africa became an inclusive democracy in 1994. Over 85 years earlier, just before the union of the four constituent provinces into the Union of South Africa in 1910, the English-speaking white community had been granted a Royal Charter for its science-academy equivalent, the RSSAf. At almost the same time the Dutch and Afrikaans-speaking white community established an academy of science and art known eventually as the *SAAWK*. The former restricted its activities to the natural sciences; the latter was broader in its scope, with a strong (somewhat later) focus on the development and maintenance of Afrikaans as a scholarly/scientific language.

For almost a century, the national science 'academy' comprised these two separate institutions. There were other bodies – and individuals – which, at various times in South Africa's history, played the role – to a lesser or greater degree – of a science academy and science advisor respectively.

During the second half-century of its existence the RSSAf was in decline, just as its political equivalents remained in permanent opposition to successive Afrikaner governments. At a time when the RSSAf had become virtually moribund – and was described in derisive terms by one of its most distinguished (Johannesburg-based) Fellows as the "natural history club of the University of Cape Town" – an attempt was made to rejuvenate the society by electing to its presidency several of the country's undisputedly pre-eminent scholars, re-injecting excitement into the public lecture series, and fashioning a strategy to make itself count in the national science system. (Gevers, 2015)

SAAWK, in contrast with its struggling rival, functioned during the same period as the *de facto* national science academy of the country. The '*Akademie*', as it was known, was one of the pillars of the Afrikaans-dominated state, recognised and funded by Parliament as a statutory organisation, extensively supported financially by the broad corporate sector, and involved in national policy formulation directly or indirectly.

It eventually had two faculties of equal size, one for the areas involved in, or dependent on the natural sciences and technology, and the other for the humanities, social and economic sciences, and the creative arts. An assessor system of awaiting membership attracted many younger scholars to its ranks. *SAAWK* awarded a large group of eponymous medals and prizes which were always prominently featured in the media.

SAAWK was nevertheless constantly troubled by dissension between its faculties about the national role it sought to play for the whole (white) population, and the agenda of making Afrikaans a fully developed scientific and scholarly language, in the service of what was effectively only a sub-sector of the country's white people. The English-medium universities at that time were considerably more active and productive in research than their Afrikaans counterparts, better linked internationally, and less affected by the loss of talent to government service. The *Akademie* found that it could not claim to speak for science and scholarship at a national level.

The tension between the two schools of thought in *SAAWK* began to express themselves in a number of internally controversial proposals that a separate new body should be formed at arm's length from the *Akademie*, but confined to the natural sciences and technology fields.

An additional academy devoting itself largely to societal benefit and transformation

In 1986, the first black South African with a doctorate in applied nuclear physics, Dr Gordon Sibiya, founded SEASA in order to help bring science, engineering and technology to the country's underprivileged youth at school. Under the aegis of this body, which was entirely black-run although supported by a number of prominent white RSSAf Fellows, teachers, professional scientists and engineers, who voluntarily gave of their time to teach learners from disadvantaged backgrounds at a university on Saturdays.

SEASA became a very praiseworthy body. More than 12 000 black learners, young men and women, passed the matriculation examination through this programme over an 18-year period, many of them obtaining distinctions in mathematics and science, and obtaining scholarships to pursue science and engineering degrees. (Gevers, 2015)

Out of the crucible – a new science academy for a new South Africa

A man who at the start of the 1990s was both a recent chairman of *SAAWK* and current head of the country's major public science and technology research funder, the then Foundation for Research Development (FRD), fully aware of the facts on the ground, and a visionary to boot, became the (publicly invisible) patron of a project to establish a new science academy for South Africa. His name was Dr Reinhard Arndt. Arndt was incidentally also a member of SEASA.

The intense academic isolation at the time was a strong catalyst for initiating change. The late 1980s were characterised by severe economic sanctions imposed by the international community on the pariah apartheid state, accompanied by increasing isolation of its academics and their institutions through boycotts, bannings and exclusions.

When a distinguished mathematician who was a member of both the national academies of Cameroon and France visited South Africa, he offered to arrange a meeting between the leaders of three local 'academies' (*SAAWK*, the RSSAf and SEASA), and African members of the *Academie Francaise* at the United Nations Educational, Scientific and Cultural Organisation (UNESCO) headquarters in Paris. Arndt offered to lead the visit overseas. To their disappointment – but not surprise – they were kept endlessly waiting in a Paris hotel until departing on their homeward journey with nothing to show for their effort but friendly personal relations.

The visit did however produce a report by Prof Wieland Gevers then acting deputy Vice-Chancellor at the University of Cape Town (UCT) and Prof Danie Joubert, who at the time chaired the Scientific Advisory Council (SAC) to the State President.

It was by now perfectly clear that not one of the three 'academies' participating in these interactions could ever become a truly inclusive, nationally functioning science academy for South Africa, nor would any one of them be likely to gain recognition by any foreign academy. The three bodies could, however, join together in establishing an academy that would answer to the whole population, be different in its mission from its progenitors, independent of government but trusted by it, and using the excellence criterion of membership as a basis for service to the whole country rather than for individual aggrandisement.

Each of the three participating bodies was asked to nominate three persons to constitute a planning group for the new academy. Meetings of the group were held in 1990 and 1991, and a degree of consensus was hammered out on a number of basic points of departure.

In 1991, Gevers – with some assistance from former Deputy Head of the Atomic Energy Corporation (AEC) Dr Raymond Loubser – drafted a plan to create a unitary academy of sciences. After some debate and amendments, the plan was adopted as a suitable basis for further action, and each of the participating bodies was asked to nominate 12 representatives to a steering body to implement it. Chapter 2 goes into more detail about the drafting and contents of the plan.

In 1994, a draft constitution was adopted. A year later, 100 Founder Members had been elected, and the Academy was launched as a voluntary association in 1996. (Nelson Mandela Foundation, 1996)

The Academy of Science of South Africa is finally realised

ASSAf came into being in 1996 at an inaugural meeting in Pretoria, where its Founding Members accepted its Constitution. Its Membership from the outset included a wide variety of scientists from all disciplines. It was home to the natural sciences, social sciences, humanities, economic sciences, engineering and the health sciences, as well as the agricultural sciences. The organisation was intended to be completely non-discriminatory on the basis of race and gender.

Dr Khotso Mokhele – only 40 years old at the time and also the new President of the FRD – was elected first President of ASSAf at the first meeting of the Academy, along with other new office-bearers and Council Members.

> *"When I accepted the nomination, I was motivated by the ideals of an inclusive Academy that values excellence in science and scholarship. I was hoping for an Academy that would go beyond science as understood as natural science but the one that embraces excellence in all fields of science including the social sciences, as well as the one that recognises excellence in other walks of life such as in law and engineering." – First President of ASSAf, Dr Khotso Mokhele, September 2014*

ASSAf was perceived as having been formed in response to the need for an academy of science congruent with the dawn of democracy in South Africa – activist in its mission of using science for the benefit of society.

SEASA had throughout the build-up evaluated its continued participation in the establishment of the new Academy, on several occasions, accusing it of elitism, most likely due to its closed, elected membership, common to science academies all over the world. Despite this, academies from around the world came to pledge their loyalty at the inaugural meeting in Pretoria.

When the Academy of Science of South Africa Statute was passed by the South African Parliament as Act 67 of 2001, the *SAAWK* statute was simultaneously revoked. ASSAf thus became the only national science academy of South Africa. The new Academy differed from the previously existing bodies in having a core mission of providing evidence-based advice to the government and the nation, as indicated by the motto: "Science for Society".

As the official national academy of science of South Africa, ASSAf represents the country in the international community of science academies. Since its inception, ASSAf has grown remarkably from a small, emergent organisation to a well-established and internationally connected academy.

Before we broaden our description of ASSAf's genesis, it is important to refer again to the historical context in which it was founded.

A more detailed history of science academies in South Africa

The academy idea has been presented in South Africa in various guises for over 150 years.

One historical sequence led from the formation of the South African Institution in 1825 to the South African Philosophical Society in 1877 and that, in turn, developed into the Royal Society of South Africa (RSSAf) in 1908, which by virtue of its statutes is dedicated to the furtherance of science but flourishing mostly in English-speaking circles and institutions. A separate historical strand was initiated by a Parliamentary statute that in 1909 called into being the *Zuid-Afrikaansche Akademie voor Taal, Lettere en Kunste*. In 1941, it developed into the *Suid-Afrikaanse Akademie vir Wetenskap en Kuns* (*SAAWK*), largely,

but not entirely, pre-occupied with the promotion of the Afrikaans language in the arts and sciences. Yet another significant development was the creation of the Science and Engineering Academy of South Africa (SEASA) in 1986. A true academy in its mission, it was forced by the needs of the time to temporarily address mainly the serious educational and professionalisation issues which confronted black professionals in the natural sciences and engineering at that time.

> *Each of these three 'academies' has (or in the case of SEASA had) a form which made it, to a lesser or greater extent, and for different reasons in each case, a potential rather than a real academy. In one sense, their coexistence in this country shows the importance of the idea of an academy, even in a society fragmented in its historical crucible." – ASSAf Founder Member Prof Wieland Gevers, February 2015*

Many other bodies in South Africa were either dedicated to the furtherance of individual disciplines or to the coordination and/or promotion of scientific activities in a limited or broader context. Prior to 1996, none had combined the autonomy, very high quality, and public trust that, together, provide the hallmark of an academy in the true sense – that is, a body with a responsibility to the community as a whole and not to a section of it. Discussions about the possibility of establishing a truly national academy of science to fill this gap were held in various quarters over a period of many years. Eventually, a group of determined scientists, who were continuing this discussion about the possibility of setting up a new academy, formalised the process and described it in what they called the 'Plan Document'. This document is expanded upon in Chapter 2 of this book.

In 1989, Arndt approached the then RSSAf President Prof Frank Nabarro to nominate a number of the society's members to participate in the discussions convened by the FRD to establish a national academy of science. They would contribute to the discussions as individuals and not as representatives of the RSSAf and would join the Members of the *Akademie* who were already part of the discussions, also contributing in their personal capacities.

The first planning meeting to discuss the establishment of a national academy of science in southern Africa took place in September 1989, instigated by the Akademie. The chairperson of the *SAAWK* Dr Louw Alberts requested Arndt, Prof Chris Engelbrecht, Dr Chris Garbers, Dr Johan Garbers and Dr Raymond Loubser to consider whether or not the *SAAWK* should initiate discussions on the establishment of a body to fulfil a "guiding role in science and technology at a top level in South Africa both inside and outside government". (Botha, Hannekie, 1989)

> *This move was not undertaken by a few people. And it was supported by many. The Minister of Education, Gerrit Viljoen put his weight behind us. The CSIR's Dr Chris Garbers did not resist despite knowing that the role of the CSIR in advising government would be diminished. He was on board. His brother Dr Johan Garbers at the Human Sciences Research was on board. We had discussions with leading black scientists such as Dr Bob Seretlo and Dr Gordon Sibiya and without exception everyone was excited at the prospect of a new academy of science." – ASSAf Founder Member, Dr Reinhard Arndt, July 2015*

At the time of ASSAf's formation SEASA was an academy devoting itself largely to societal benefit and transformation.

> *"One of my dearest wishes is to succeed in establishing a working link between the existing professional associations and the various political organisations in the country to ensure that judicious and realistic decisions are taken concerning black education and economic and social developments in the country."*
> *– Dr Gordon Sibiya, March 1999*

SEASA's aims were briefly stated as follows. "The academy is a professional, voluntary, non-profit-making association mainly to pursue scientific and engineering goals for the benefit of man. Its central task is to study and update the projected manpower requirements of the country in these disciplines and to apply this in an ongoing effort to generate scientific and technical skills, particularly within the ranks of the black population."

Setting the scene, the SA science landscape in the early 20th century

The history of science in South Africa is complex and interesting. It gives context to the establishment of various academic societies and the launch of ASSAf in 1996. Certain individuals acted as science advisors to the head of state at different times during the 20th century. Certain organisations, such as the Council for Scientific and Industrial Research (CSIR) at one point, acted as scientific advisory bodies to the government in the same way an academy of science would. This section does not by any means give a thorough account of the history of South African science and scholarship. It simply touches on those aspects that helped shape the academy idea.

Historically, the flow of scientists in and out of the country, the exchange of scientific personnel and collaborative scientific activities happened unhindered. This began in the latter part of the 17th century when South Africa became a colony, first under the Dutch and then under the British. The colonial governments lured scientists and academics here and supported their scientific endeavours. Many of them became instrumental in building scientific disciplines and rendered able leadership and direction to scientific research. The colonial legacy, the focus on specific branches of science and their consequent growth in South Africa are distinctive, if not unparalleled, in the history of science. (Sooryamoorthy, 2015)

The discovery of gold and diamonds, in 1867 – 1875, caused an upheaval in society. Highly concentrated populations agglomerated in search of these precious materials. Rail and road communications had to be developed rapidly and mass food production had to be ensured. This situation completely changed science's grounds of operation. Mining enterprises found that they needed engineers, geologists, later on geophysicists, chemists and even doctors of occupational medicine or parasitologists. The colony could not supply such professionals, and qualified people had to be brought from Europe. Scientific employment became a reality.

Some of the provinces employed a government scientist. The Cape engaged chemists, veterinary surgeons and entomologists. Some provinces had agriculture departments that employed scientists. But it was recurring disasters (plant diseases, animal parasite attacks, linked to the transformation of agriculture for mass production or the opening up

of frontiers and increased circulation of people), that led the governors to turn to science to come up with solutions. (Mouton, 2001)

A trend, already apparent in the last decade of the 19th century, was the multiplication of professional associations: engineers, architects and surveyors, geologists and the medical professions all launched associations. Nevertheless, in the early part of the 20th century, despite the proliferation of professional associations, South Africa's few scientists still operated in a territorial and relatively isolated manner.

It was only in the 1940s that scientific organisations started taking shape enabling scientists to do good work. Veterinary science, for example, the jewel in the crown of South African research at the time, brought forth the Onderstepoort Veterinary Institute that funded itself from vaccine sales across Africa.

During World War II, South Africa suddenly found itself obliged to find substitutes for many of the products it had previously imported. The country had to supply armies in Africa and the Middle East with a whole variety of items ranging from vaccines to preserved meat, spare parts for aircraft and boats to armaments and precision equipment such as radar. It was in this context that the CSIR emerged after World War II.

Various organisations fulfil the role of science academy

When the conflict ended, science was regarded in a new light. It was thought of with a mixture of fear and admiration. People believed it capable of overcoming any technological barrier. 'Big science' now demanded an alliance between the fundamental scientists and engineers, and necessitated good organisation and large-scale resources. It entered the realm of public affairs and the political arena. (Mouton, 2001)

In 1944, South African Prime Minister, General Jan Smuts recalled physicist Sir Basil Schonland from active service in World War II to serve as scientific advisor to the Prime Minister of South Africa.

A brilliant physicist and man of action, Schonland's task was to formulate "plans for the establishment of an organisation to advise the government on the best methods of developing the country's natural resources to the full and to co-ordinate scientific research in the national interest".

By 1945, the CSIR had been constituted as a science council by an Act of Parliament.

Europe was recovering from World War II and its universities were not well equipped. As a result, some of Europe's leading scientists relocated to work at the CSIR, where the laboratories were well equipped and unique research opportunities awaited the intrepid scientist.

> *"The history of organised 'wissenschaft' in South Africa was very young and fragmented between the different cultures: English and European and the African context. So when I was young, it was a very exciting environment to find oneself in and I was very much a part of it." – ASSAf Founder Member, Dr Reinhard Arndt, July 2015*

Arndt describes how the CSIR in the late 1940s and early 1950s was seen as one of the premier places to come into contact with science. It was regarded as an arena where brilliant world players in science interacted and generated new knowledge. Located at the old barracks and ammunition factory in Visagie Street in Pretoria central, the original CSIR site operated 24 hours a day. It saw a constant stream of scientists and researchers from abroad who were coming to visit the biggest research and development facility on the African continent.

> *At least 40% of the scientists working at the CSIR were from abroad. So you had this international family of scientists working there." – ASSAf Founder Member, Dr Reinhard Arndt, July 2015*

The CSIR's role was to ensure the efficient co-ordination of research in South Africa and to entrench its role in supporting industry. South Africa's atomic energy research was located within the CSIR. Medical research was represented on the Council of the CSIR. So this was essentially a science advisory body to the government, looking after not only the laboratories of South Africa, but looking after the development of science in South Africa. The little university research that was being done was funded by the CSIR. (The universities in those days were not as active in research as they are today and were more focused on teaching.)

Schonland – described as "South Africa's scientist of the twentieth century" – was appointed by Smuts as the founding President of the CSIR (1945 – 1950). This is significant because, in this capacity, he reported directly to the prime minister of the country and was in effect the science advisor to the head of state.

Once appointed President of the CSIR Council, Schonland gathered eminent figures around him representing the top-level organs of contemporary science and a few universities oriented towards technology, the two active ministries and progressive elements of industry.

The CSIR, during the Smuts government, was for all intents and purposes the science academy of South Africa. It played a leading role in several bodies on the African continent and took an active part in the world programmes of the International Council for Science (ICSU): such as geophysical years and Antarctic research.

> *The President of the CSIR in the late 1940s and early 1950s reported directly to the Prime Minister of South Africa. Therefore that body was effectively fulfilling the role of a science academy in the country. The mathematicians were there, the nuclear physicists, engineers, chemists and botanists were there. The CSIR was the kingdom of science in South Africa at that time. Not even the US academies had a campus like that." – ASSAf Founder Member, Dr Reinhard Arndt, July 2015*

The CSIR's head of science liaison, Dr Denys Kingwill, oversaw offices and staff members in Washington, Bonn, London and Paris. The council at the time was the only body in South Africa with the budget and the infrastructure to operate in that capacity. It was the only organisation capable of answering questions of national importance that were

put to it by government, in the same way a national academy of science would. In 1950, Schonland resigned from office and was succeeded by Dr Meiring Naudé who retained the preceding model and saw the CSIR continue to grow and expand.

South Africa by the early 1950s had recognised the importance to the science sector of international contact and exchange. However, the academy-like role of the CSIR changed in 1952, when it was put under the control of the Ministry of Economics. It thereby lost its inter-ministerial status and its capacity for arbitrating. Its president was no longer automatically to be scientific advisor to the prime minister.

The Akademie becomes South Africa's de facto science academy

The Parliamentary elections of 1948 represented a turning point in the country's history. The United Party, which had led the government since its foundation in 1933, and its leader, incumbent Smuts, were ousted by the Reunited National Party (*Herenigde Nasionale Party* in Afrikaans), led by Dr Daniel Francois (DF) Malan.

Malan was not a scientifically orientated prime minister at all and, as mentioned, the Council of the CSIR was relegated to reporting to the Minister of Economics, Eric Louw, instead.

The *Akademie* became the *de facto* science academy of the country as enacted by Parliament in 1950, but the fact remained that it represented a home for only Afrikaans-speaking scientists. The organisation found that it could not claim to speak for science and scholarship at a national level if a substantial number of the outstanding figures in the intellectual landscape were not members.

The very English-orientated RSSAf simply could not fulfil the role of a South African academy either, as some scientists criticised it for being an appendix to London. Each of the existing scientific societies really only represented a section of the scholarly community in South Africa.

The Akademie explores inclusive science academy for South Africa

As a highly respected member and office-bearer of the *SAAWK*, Arndt used his position to begin to test the waters within the *Akademie* of the possibility of transforming the body into an inclusive academy of science of South Africa. The vast majority of people that Arndt spoke to responded that his idea of an inclusive academy would not work because of the history of the *Akademie*. It had started out as a home for Afrikaans-speaking scientists and could not be transformed. The RSSAf too had a specific history. Arndt therefore realised at this early stage that the only way South Africa would have a unified academy of science would be through the establishment of a completely new body.

Arndt took the issue to the council of the *Akademie* and to its annual general meeting where the response to the idea of a new academy was positive and that they were broad-minded enough to agree that the *SAAWK* should take the initiative in trying to put something together that would satisfy the broader scientific community, the universities and the government.

Meeting the needs of the minority becomes the focus of state-funded research

Over the years, the country's scientific capabilities continued to grow. But in essence, the science and technology system that emerged at the height of apartheid was fragmented and unfocused. This too was reflected in the academies and scientific societies of the country.

> *At the end of the day, they were operating in an environment where the entire focus of development was on a minority that aspired to first-world science and technology in the midst of impoverishment and underdevelopment of the majority. The minority sought to retain power and used social research and technology for the purposes of control and repression. Meeting the needs of the minority became the focus of state-funded research." – Science in Africa at the dawn of the 21st century, Country report, South Africa, Prof Johann Mouton* et al*, 2001*

The international credibility of institutions such as the CSIR was misused for access to foreign technology and to obtain scientific materials and equipment in violation of international sanctions. Sanctions also brought home the importance of indigenous science and technology development. Notwithstanding, much was achieved by the CSIR and clearly today a democratic South Africa is stronger for this heritage.

As CSIR President in the early 1980s, Dr Chris Garbers, initiated a change process to ascertain what the country expected of science and technology research in the CSIR and beyond. He invited the heads of other scientific bodies, the intelligentsia of the time, to discuss what was happening in their respective bodies and to find a way to work together without competing against each other. (Arndt, 2015)

A seed was planted during this time – in the heads of the scientists and leaders gathered to identify what was missing in South African science – that a unified central academy of science was needed. But a lot more water had to flow under the bridge before that became a reality.

The calls for a new body of eminent scientists get louder

Other distinguished scholars and interest groups drafted formal proposals at various times, calling for the creation of a body of eminent scientists and technologists in South Africa.

Access to FRD funding was based on the quality of the researcher's work and that of their research students. This led to a novel concept of peer evaluation and the rating of individual researchers in higher education, based on their recent track records and outputs in research. Their level of support was exponentially linked to this rating. The FRD's evaluation and rating system was widely acclaimed, attracting favourable international comment. An attempt was made to establish a 'collegium' of South Africa's leading scientists based on the rating system.

During 1991 and 1992, FRD President Arndt, gathered all the A-rated scientists to meet as a collegium, with the aim of advising government and fulfilling the role of an academy.

But the effort did not gain traction. (From 1984 to 2001 the evaluation and rating system applied only to scientists in the natural sciences, engineering and technology.)

On another occasion, internationally respected oceanographer, Prof Eric Simpson of UCT, presented some ideas in a document drafted in 1983, entitled *Creation of a corporate body of eminent scientists and technologists in southern Africa*. He visualised the creation of a body of pure and applied scientists of proven outstanding scientific merit who will receive due recognition for their contributions to science and be available as members of this body to undertake investigations and provide expert advice on request to governments, public bodies and the private sector in southern Africa.

One of the questions asked by Simpson was **"Who decides who represents South African science at the International Council for Science (ICSU)?"** This was pertinent considering the political isolation of the time. ICSU is a non-governmental organisation with a global membership of national scientific bodies (122 members, representing 142 countries) and international scientific unions (31 members).

> *"One of the most important functions of this body will be to accept responsibility for active international relations of a strictly scientific, non-governmental nature. It would be the logical body to represent southern African states on ICSU and ICSU unions and committees." – Eminent South African scientist, Prof Eric Simpson, March 1983*

Simpson's document calls for an elected membership based on merit alone and emphasises that eligibility shall have no regard for language, race, sex, colour, creed or nationality, as long as the candidate has worked in southern Africa for at least five years. He proposed election of the initial core membership by a carefully chosen *ad hoc* committee of six outstanding scientists; three nominated by the *Fakulteit Natuurwetenskap en Tegniek* of the *SAAWK* and three by the RSSAf.

Simpson even went so far as to suggest names for the new body including: *Academy of Sciences of Southern Africa, Academy of Southern Africa, and Academy of Science and Technology in Southern Africa*. He concluded that each independent country in southern Africa may wish to have its own national academy.

It was also in the early 1980s that the South African government established the Scientific Advisory Council (SAC) to provide guidance on science policy and programmes. SAC reported to the Department of National Education. Its terms of reference were broad and, in theory, it had the ear of the government.

It oversaw the operation of the science system and funding of the science councils under a dispensation of framework autonomy; and oversaw interaction with neighbouring countries and the international scientific community. But the SAC was constrained by the cloak of confidentiality that shrouded its activities. No independent assessment can be made of the extent, quality, relevance, or impact of its advice in the absence of a public record of its activities.

Science and technology at the dawn of democracy

The intensification of the struggle against apartheid (Soweto 1976) led – in the field of science and technology – to the introduction of the academic boycott and increasing isolation of South African scientists. In the field of science and research, it also led to the rise of 'anti-government' research organisations (many in civil society), the founding of the United Democratic Front, the National Education Crisis Committee (1986) and so on. In 1985, the political situation had deteriorated to such an extent that a national state of emergency had to be declared. This signalled, for all practical purposes, the death of apartheid. It initially led to a more moderate reformist philosophy under PW Botha and later – under FW de Klerk – to the acknowledgement that apartheid had failed. In a historic speech on 2 February 1990, De Klerk announced the unbanning of the African National Congress (ANC) and the unconditional release of its leader Nelson Mandela from prison.

After the ban on the ANC was lifted, many of its administrative departments, which had been based in Lusaka, Zambia, during exile, transferred to the new headquarters in Johannesburg. A group of ANC-aligned scientists and engineers produced a position paper on science and technology during 1990. In July 1991, the Science and Technology Group (STG) was founded and in May 1992, the STG put various policy proposals related to science and technology on the table at the ANC's national conference. (Mouton, 2001)

In 1993, South Africa launched the Science and Technology Initiative (STI). Bringing together a wide range of scientific organisations and members of the democratic movement for the first time, its aim was to consider processes and developments relating to science and technology during the transition to democracy and beyond. The working group included Jay Naidoo, then with the Congress of South African Trade Unions (COSATU), Dr Brian Clark of the CSIR, Dr Chris Garbers of the SAC, Dr Rolf Stumpf of the Human Resouces Research Council (HSRC), Prof Friedel Sellschop of the Committee of University Principals, Roger Jardine of the ANC, Cromet Molepo of the South African National Civic Organisation and Dr Bernie Fanaroff of COSATU.

> *Science and technology have an important role to play in the development of all sectors of our society [and] technology policy must address the [extremely unequal distribution of resources], and must also address both the development of indigenous and exogenous science and technology, in order to meet the challenges of South Africa's people." – South African government's Reconstruction and Development Programme White Paper*

The STI recommended that the country, for the first time in its history, have a dedicated Ministry of Science and Technology.

The STI warned against a model that has fallen into disuse, for good reason, namely the monolithic ministry or academy, which controls all research. It recommended instead a specific ministry to deal with science and technology, an advisory council to act as a confidential advisor to the government and the use of leading national science and

engineering institutions or societies as a source of opinion in response to specific requests from government (for example, the US National Academies of Sciences (US NAS) have undertaken much work on public policy).

It is also significant that the debates and consultations around the formation of a unified national academy of science for South Africa occurred at this time, because it meant that the democratic spirit of 'giving everyone a voice' entered the academy debates as well, and all disciplines that were empirical in nature were included.

After the elections in 1994, the first Minister of Arts, Culture, Science and Technology requested the STI be reconstituted as the National Science and Technology Forum (NSTF) for the purposes of consultation on science and technology issues between the ministry and the broader science community of the country. Through these bodies it became apparent that a national academy of science of South Africa could play an important role in a democratic science system in South Africa.

In this process, the country had developed a very noble and huge capacity for and involvement in consultative forums. However, recalls Gevers, primary author of the plan to create a unitary academy of sciences, this also meant that the terrain that the new academy was entering, that of advising government, was already pretty crowded. The NSTF already existed at the time when the new government of national unity came into being. "So we had to ensure that the role of the academy was clearly defined and understood."

> *A nation's commitment to science and technology, or S&T, is often an indicator of its stage of economic, social, and cultural development. In South Africa, we are fortunate to have a strong S&T infrastructure, including numerous institutions and well-trained people. I remember the advice given to me by Dr Thomas Odhiambo of the African Academy of Sciences, about how important our future investments are in the area of S&T and how many African countries are only now realising that they would have been further along the path of economic development had they recognised, following independence, the importance of investments in this area. This lesson has not escaped our new government and indeed S&T is recognised as a major pillar of the Reconstruction and Development Programme." – Nelson Mandela, September 1995*

A year after Mandela's comments in the quote above and six months after the launch of the Academy of Science of South Africa, in September 1996, the White Paper on Science and Technology was published. The White Paper states that **"Scientific endeavour is not purely utilitarian in its objectives and has important associated cultural and social values. It is also important to maintain a basic competence in 'flagship' sciences such as physics and astronomy for cultural reasons. Not to offer them would be to take a negative view of our future – the view that we are a second-class nation, chained forever to the treadmill of feeding and clothing ourselves."**

During the transition to democracy, the position of South African science grew as the country started playing a leading role in science regionally and on the continent. There

was increased collaboration with other countries. During the early 2000s, the country emerged as having a contribution to make to global science. In its 2002 research and development strategy document, the department, now known as the DST explicitly recognised that science is global and its scientists have to be well connected with the world body, developing not only collaborations across Africa but also tapping into international resources. The department at that time committed itself to revitalising research institutes and fine-tuning higher education institutions to boost scientific cooperation.

This was at the same time that DST committed substantial funding to ASSAf, to complement the Academy's international funding sources. More about this period in Chapters 6 and 7.

Science is the cornerstone of development. As the connection between scientific advancement and development becomes firmer, South African efforts are directed towards democratising science and strengthening the scientific system. This is increasingly relevant and indispensable for countries on the path to scientific progress.

The spinoffs of this approach are apparent today as the country prepares to host the lion's share of the international, multibillion dollar, Square Kilometre Array (SKA) astronomy project. The SKA telescope will be the world's biggest telescope and one of the biggest scientific projects ever. This is just one example of South African science having a global impact.

The academies today

With the exception of SEASA – which ceased to exist in the early 2000s, the other two historical academies still exist alongside ASSAf today, each with a niche role carved for itself.

Well established as the official academy, ASSAf fulfills its mandate of providing evidence-based science advice and honouring scholarly excellence in the service of society.

The RSSAf over the decades adapted to new circumstances and adjusted its procedures and activities accordingly. The 'fields' of science within the society have also altered and the following are now recognised as integral to the society's activities: the life, physical, mathematical, earth, chemical, medical, engineering and human sciences. The RSSAf retains few links with the mother body, the Royal Society of London, as it is not a national science academy like the latter influential organisation.

The society continues to provide support for research in many fields including interdisciplinary conferences, symposia, colloquia and workshops. The RSSAf publicises and disseminates its journal *Transactions*. After one hundred years of continuous publication, this journal can be mined as a history of science in South Africa. The fact that this journal has survived for a century, and weathered the dominance of specialist disciplines is to its credit.

Today the *SAAWK* is an Article 21 company and a multidisciplinary organisation, encompassing a wide range of scientific and artistic fields, with its main objectives being the

advancement of science, technology and the arts, as well as the promotion of Afrikaans usage and the maintenance of good linguistic standards.

The organisation manages various prestigious awards in the scientific and cultural field, including the Hertzog Prize for literature (awarded for drama every third year), as well as a range of other prizes and medals for artistic achievement in theatre and the performing and fine arts.

The iconoclasts and the shape shifters

The formation of the Academy brought out the best in a group of people who changed, and vastly broadened, the science playing field in South Africa. The path-finders included the chemist and father figure of late 20th century South African science, Dr Reinhard Arndt, a descendant of German missionaries, who – along with Professor Malegapuru Makgoba, a distinguished medical scientist and academic leader hailing originally from Sekhukhuneland, and the master strategist and subsequent captain of the ship, Professor Wieland Gevers, also a South African of German missionary extraction and also a medical scientist – drafted the Academy of Science of South Africa bill.

Arndt, Makgoba and Gevers were natural allies when trying to get the idea of a unified national academy off the ground. Arndt was a 'big-picture' thinker, Makgoba a powerful personality, and Gevers a detail-orientated workaholic. Due to his position and nature, Arndt had the power and money to make it work, Makgoba was a critical analyser of situations, while Gevers had the determination and ability to make it work whatever it took – this included drafting the 'academy plan' as well as the draft constitution, and getting buy-in from as many parties as possible.

The pioneers of ASSAf also include the Founder President Dr Khotso Mokhele, strategic thinker, science manager, visionary leader and ambassador for South African and African science in high-profile international arenas.

Then there were the senior civil servants who played a leading role in attaining statutory recognition for the Academy. Roger Jardine was a staunch supporter of the concept of unified Academy of Science for South Africa and had been party to the very early negotiations between the ANC and representatives of the pre-democracy science academies and science system. As Director-General of the Department of Arts, Culture Science and Technology (DACST), Jardine insisted that the existing 'academies' be required to support the draft ASSAf bill and placed the ball in ASSAf's court to propose a *modus operandi* for cooperation.

Dr Rob Adam, physicist and former struggle activist, who answered the call of history when he was appointed Director-General of the Department of Arts, Culture, Science and Technology where he facilitated the path of the Academy bill and subsequently the Act of Parliament that brought ASSAf into existence.

In the early 1990s, there was a lot of pressure on black academics and thinkers to lead the efforts to help build and develop a democratic science system in South Africa. It was

important that ASSAf be seen to be inclusive in terms of race and hence the involvement of two excellent younger black scientists, namely Mokhele and Makgoba.

> Arndt was associated with *SAAWK*, Gevers with the RSSAf and Dr Gordon Sibiya was the main driver behind SEASA. So, I guess Mokhele and I were the 'outsiders' in the sense that we were not associated with any specific organisation, but we were seen as facilitators at the time." – Prof Malegapuru Makgoba, August 2015

The other key role players included Dr Raymond Loubser, Prof Brian Warner, Prof Chris Engelbrecht (theoretical physicist who once famously said "but engineering is not a science"), Dr Johan Garbers, Prof Duncan Mitchell and Prof Bob Seretlo, and many more such as Prof Friedel Sellschop, Prof Frank Nabarro and in a support role the enthusiastic and energetic Hannekie Botha.

> It is testimony to the people involved in the creation of this ASSAf that the process was a success. A lot of people sacrificed their turf. And there were big personalities around the table and difficult people too. What kept us on the path was the belief that we were creating a body capable of serving this country and capable of linking on par with the rest of the world." – ASSAf Founder Member Dr Reinhard Arndt, 2015

There were those who insisted that the new academy should be an academy of the natural sciences and technology only. Sibiya was among those who held this belief and he was very adamant about this. Gevers recalls how during one meeting, the then President of the HSRC, Dr Johan Garbers, brother of the CSIR's Dr Chris Garbers, banged his fist on the table and threatened to walk out of discussions because several parties, Sibiya primary among them, was suggesting that the academy be purely a science and technology academy.

Many of these role-players who facilitated the birth of the new academy have become giants of South African science and some have played major roles on the international stage as well.

The early academy was criticised in some quarters for getting off to a slow start. Some even said the Academy consisted of two people, Prof Iqbal Parker and Gevers who persistently dedicated themselves to getting the organisation off the ground in the late 1990s and early 2000s.

The democratic transition in South Africa was an extremely exciting time of opening doors and doing things in a different way.

Chapter 2: The Case for a New Academy

The science academy has a particular emphasis on excellence in the application of scientific thinking to tackle the problems and challenges facing society. In South Africa it was argued that a new academy would draw on its members from across disciplines to provide effective advice and facilitate appropriate action in relation to the collective needs, opportunities and challenges of all members of society.

It was an ideal that the new academy would result in more efficient management of science as a national asset. A body comprising the brightest minds and invested with oversight and advisory privileges, the academy would prove an invaluable resource to the science and technology establishment. It would exemplify the democratic virtues of transparency, accountability and civic responsibility and become an enduring fixture of post-apartheid South Africa.

Scientists interested in the academy began a process of extensive consultation to ensure that they established a representative science academy; an academy that would be home to the natural sciences, social sciences, the humanities, the economic sciences, engineering and the health sciences, as well as the agricultural sciences.

The effort sought to mobilise the whole science and technology community to support the establishment of an academy whose objectives would be to promote common ground in scientific thinking across all scientific fields and, in addition, to promote the optimum development of the intellectual capacity of all people in the country. It must further provide effective advice and facilitate appropriate action in relation to the collective needs, opportunities and challenges of all South Africans in the field of science and technology.

The objectives of the academy would be designed to ensure that individuals, who have made significant contributions to science, act in concert and across all disciplines in providing direction to the scientific community. They would facilitate appropriate action in relation to the collective needs, threats, opportunities and indeed, challenges of all South Africans.

The case for an academy of science in South Africa is eloquently expressed in the preamble to the Constitution of ASSAf as adopted in 1996, which provides a general statement of the way in which this particular academy would be both special for South Africa and very much part of the 'academy idea' internationally. (Group, 2006)

Informal meetings sponsored by the FRD get the ball rolling

The FRD sponsored informal meetings of a small number of individuals over the period October 1989 to April 1990. This action had its origin in an enquiry conducted by the *SAAWK*, which concluded that the *Akademie* did not function as an academy of sciences and was not likely to do so in the future. While no such conclusion was formally reached by the RSSAf and the SEASA, various members of these two bodies agreed to

meet with two senior black scientists and several members of the *Akademie*, in order to seek answers to the question of whether there was a compelling case for the creation of a unitary academy of sciences. Their mandate included an exploration of the general form that such an academy should take and how could it be brought into being.

The discussions convened by the FRD were directed towards the creation of a new body and did not attempt to bring together the existing bodies nor expand their roles in order to become a national academy.

Mindful of the failure of several previous attempts to proceed along this particular path, the group decided to seek an informal consensus on these questions and then to allow the matter to develop in a wider context. It should be emphasised that there has not been an opportunity for a scholarly analysis of the situation: to some extent, the informal group has viewed itself as composed of 'concerned citizens' – aiming at primarily the rapid facilitation and stimulation of further necessary actions and events.

The group saw themselves as designers of the new national academy and not as founding members. They believed that "a new, unitary academy of sciences would be most valuable at a time when there were better prospects than ever before for commonality of purpose among South Africans and when the potential for good and effective action by such an academy was especially great; this applied to both the internal and external terrains of scientific activity". The mission of the new academy would be to apply the highest level of scientific thinking in the service of the nation and especially to be the instrument for conveying considered scientific opinion and advice to government, the people and the world at large.

A planning committee: A suitable basis for further action

A planning committee chaired by convenor Dr Reinhard Arndt and including Prof Wieland Gevers, Dr Raymond Loubser, Dr Gordon Sibiya, Prof Brian Warner, Prof Chris Engelbrecht, Dr Johan Garbers, Prof Duncan Mitchell and Prof Bob Seretlo met regularly during 1990 and early 1991 to pave the way.

Dr Reinhard Arndt	Prof Wieland Gevers	Dr Raymond Loubser
Dr Gordon Sibiya	Prof Brian Warner	Prof Chris Engelbrecht
Dr Johan Garbers	Prof Duncan Mitchell	Prof Bob Seretlo

The so-called 'gang of nine'

The nine members of the planning committee, known as the 'gang of nine', were drawn from *SAAWK*, RSSAf and SEASA, who operated as individuals and kept their respective academies informed of progress.

The planning committee was convinced that South Africa needed an academy of science but they also knew they had to get buy-in from across the scientific community. The members agreed to define science in its broadest sense, as in the German *wissenschaft*, a term for any study that involves the systematic search for evidence in an open-ended manner.

Consultation beyond the existing academies

The planning committee realised that the new, unified, national academy would only be successful if it had the support and commitment of the total South African public. They discussed the idea of the academy with the three existing academies and all three supported the creation of a unitary academy in principle. They also discussed the proposed body with the broader science community including university principals, a wide range of academics, people from the private sector, scientific societies and a number of politicians in the making of science policy at the time. With very few exceptions the idea of an academy was supported enthusiastically, but it was felt strongly that the academy would only have legitimacy if the members were representative of the broad South African community.

The group agreed that the national academy should be based on excellence, be a fully independent body, should not overlap in its objectives with existing bodies, be fearless in stating its views, set standards, fulfil an advisory role, point to new fields of endeavour, give "vision of wisdom and truth" and have a budget. They also recognised that unless the body gained the respect of the black community, it would not be worth pursuing.

> *These events unfolded in the 1980s and early 1990s. I was not even in the country at the time. When I was contacted to be involved in forming a united Academy of Science in South Africa, I decided it sounded like a good idea. I was drawn to the concept of a unified Academy as a voice of scholarship in the country. It was an attractive way to consolidate the unifying spirit at the time." – First General Secretary of ASSAf, Prof Malegapuru Makgoba, August 2015*

Professor Malegapuru Makgoba, who was studying abroad, had not even considered returning to South Africa at that time. He adds, "If I recall correctly it was Dr Rein Arndt who as President of the FRD asked me to review a science project. He was obviously happy with my work on that and so when the conversation started about the establishment of an academy I said yes I'd like to be involved. Perhaps for the fact that I was based overseas and had an idea of how the academies overseas worked, I was considered a good contributor. I was, for example, a Member of the US Institute of Medicine at that time."

The convenor Arndt also drew in the person who would later become the first President of the Academy, Dr Khotso Mokhele. Arndt had spotted the young Mokhele and identified him as a promising science leader. He convinced the young microbiologist to leave his academic career and join the FRD as Arndt's understudy.

Through the networks of people like Seretlo, Makgoba and Mokhele, as well as the university rectors, the planning committee was able to make contact with many black intellectuals and thinkers in order to get their input.

> *Ideally we would've preferred to have involved even more representatives of the black scholarly community, but there were so many competing interests, so many priorities to attend to in South Africa in the early 1990s, that people were not always able to respond to our invitations. We had all the disciplines there, but we didn't have all the cultures there. I would've liked a stronger presence of high-level black voices." – ASSAf Founder Member Dr Reinhard Arndt, July 2015*

The founders of the new Academy were also determined that this national academy should have links with other science bodies locally and internationally. They therefore visited the US NAS for advice, and they found great support in Sir Aaron Klug, an ex-South African and President of the Royal Society in London.

At the launch in 1996, the ultimate coup was having the first democratically elected President of South Africa to not only launch the Academy but also agree to act as patron. (It was a stroke of luck that then President Mandela's son-in-law worked at the FRD and this allowed Arndt access to the leader of the country to invite him to launch the body.) What better way to ensure the whole country's buy-in than to involve their beloved leader Nelson Mandela? And, as Arndt has stated, if you don't have the support of the President of the country, then why are you doing it? Well the President did support the effort and he was there on the day of the launch to confirm his commitment.

Plan to create a unitary academy of sciences

In 1991, Gevers, with some assistance from Loubser, drafted a *Plan to create a unitary academy of sciences*, at the request of the other seven representatives of the three participating bodies. After some debate, the plan as amended was adopted as a suitable basis for further action, and each of the participating bodies was asked to nominate 12 representatives on a steering body to implement it.

Because of its extreme relevance to this history, the plan is quoted here in its entirety (edited only to bring it into line with the style of the present account):

> ### A Plan to Create a Unitary Academy of Science for South Africa
>
> Scientific thought and activity enrich us profoundly; they empower us to shape our living environment; they are keys that can open the doors to a peaceful and prosperous future. In a free society, an academy of sciences can be at once a symbol, an inspiration and a source of reliable counsel. It should take a form which is appropriate for the time and the place, allowing for further development through flexibility in its constitution. It should be fearless in its principal mission to respond with effective advice and action to our collective needs, dangers, opportunities and challenges.
>
> ***Is there a need for a unitary Academy of Sciences for South Africa?***
>
> The function of scientific activity is to create, in a disciplined and systematic way, a continuum of coherent, rational and universally valid insights into reality in all its various facets. This is generally associated with the removal of barriers between people, as scientific knowledge represents a common ground for constructive cooperation and intellectual enrichment. Scientific thinking is fundamental to much of the best work done in the applied sciences and technical fields such as medicine and engineering, and this applies also to the human sciences.
>
> An academy which effectively harnesses the minds and energies of the most able practitioners of scientific thought would reflect, as almost nothing else could, the strong bonds between scientific disciplines and the unique character of the scientific contribution to the lives of all citizens.
>
> The academy idea has been present in South Africa in various guises for over 150 years. One historical sequence led from the formation of the South African Institution in 1825 to the South African Philosophical Society in 1877, which developed into the Royal Society of South Africa in 1908, which by virtue of its statutes is dedicated to the furtherance of 'science' but flourishing mostly in English-speaking circles and institutions. A separate historical strand was initiated by a Parliamentary statute that in 1909 called into being the *Zuid-Afrikaansche Akademie voor Taal, Lettere en Kunst*. In 1941, it developed into the *Suid-Afrikaanse Akademie vir Wetenskap en Kuns,* largely but not entirely pre-occupied with the promotion of the Afrikaans language in the arts and sciences. Yet another significant development was the creation of the Science and Engineering Academy

of South Africa in 1986; while a true academy in its mission, it has been forced by the needs of the time temporarily to address mainly the serious educational and professionalisation issues which confront blacks in the natural sciences and engineering. Each of these three 'academies' has a form which has made it, to a lesser or greater extent, and for different reasons in each case, a potential rather than a real academy. In one sense, their co-existence in this country shows the importance of the idea of an academy even in a society fragmented in its historical crucible.

A large number of bodies also exist in South Africa that are either dedicated to the furtherance of individual disciplines or to the coordination and/or promotion of scientific activities in either a limited or a broader context. In no case is there the peculiar association of autonomy, very high quality and public trust that is the hallmark of a unitary academy, which should be the body that has a responsibility to the community as a whole and not only to a section of it.

The position and structure of the unitary academy

With respect to the optimal form of an academy of sciences for South Africa, the group believes that the new body should be centrally placed in the system of science in the country; it should not adapt to other existing organisations, but the latter should rather be encouraged to adapt to it in a synergistic manner. The academy should be autonomous and independent of government control. (Note: this does not exclude an enabling Parliamentary Act that would clearly define the powers of the academy to elect its own members and office-bearers, to operate its own financial affairs and to speak its mind at any time on any matter within its competence, limited in all instances solely by codified civil and criminal law.) The academy should elect its members on the basis of general, as well as special scientific abilities, since the intention is to create a body of persons who will be activists in the good sense of the word. The cardinal emphasis in the academy would thus be on service, as well as on recognition or reward for past achievements, on the solution of problems through scientific analysis rather than the stimulation of individual scientific disciplines, and on the promotion of scientific thinking and activity in the broad rather than the narrow sense.

The unitary academy of sciences, as a premier, non-governmental, scientific body, should be in a particularly favourable position to act as a link with international scientific unions and related organisations. It should also be able to establish fruitful links with academies (or equivalents) that exist in other countries. In Africa, especially, it should interact with equivalent academies, and form regional or continental organisations with common purposes and objectives.

The size of the proposed academy, as well as its detailed constitution and general modus operandi, would have to be worked out at a later stage. The question of an adequate financial base would also require attention.

The last problem relates to the manner in which an academy of sciences can be brought into being. In view of the prior existence of three 'academies' (Royal Society of South Africa, *Suid-Afrikaanse Akademie vir Wetenskap en Kuns*, Sci-

ence and Engineering Academy of South Africa) the group is of the opinion that the direct involvement and support of these bodies should be sought in the first instance. This will lessen or eliminate the possibility of future conflict over organisational roles and functions, and provides much the best chance for general legitimacy to be accorded the new academy at the critical initial stage of its existence.

It is suggested that an appropriate first step would accordingly be the nomination by each of these three bodies of 12 outstanding persons unequivocally recognised by them as fine scientists with leadership qualities. Such nominations need not be restricted to the members or fellows of the particular body concerned. These persons would constitute a 'facilitating committee' which under an elected temporary chairperson elected by themselves would draw up a detailed draft constitution for the academy, and select a suitable name for it. The 'facilitating committee' would have the power to consult with relevant people also outside the nominating bodies, and to co-opt further members complying with the requirements, to address any unbalances, up to a total membership of 40. The committee should think through the first election process and spell out the details in the draft constitution. It is proposed as a matter of principle that the 'facilitating committee' should elect the first fellows and that the 'facilitating committee' members would not be eligible for the initial election, but that they may be elected subsequently. These processes would bring the total of substantive fellows to 100, to form the foundation membership, which would elect the first president and office-bearers.

The 'facilitating committee' will be required to discuss the draft constitution with the three existing 'academies' and to make every effort to reach agreement with them on a constitution before its formal implementation, i.e. before election of the first fellows. The 'facilitating committee' would be dissolved just prior to the inaugural meeting of the new academy.

There are very good reasons to believe that a full-time office-bearer and an efficient secretariat will be needed early on in these developments. Substantial funding for legal, travel and general operating costs up to the inauguration will have to come from Parliament or from other sources. The human investment will have to be much greater: the academy will require energy, skill and a high degree of cooperation to evolve, within a few years, into a body that is respected by government and society alike, for its contributions to the building of a secure future for all the people of South Africa.

The signers of this report call on the goodwill and support of the three existing 'academies' in order to effect an historic transformation of the scientific landscape of our complex, troubled but hopeful country and continent.

R R Arndt
J G Garbers
R S Loubser
C A Engelbrecht
W Gevers
D Mitchell
J R Seretlo
G Sibiya
B Warner

September 1990

Throughout this process, the group, through individual members, met regularly with the government, represented by then Minister of Constitutional Development Gerrit Viljoen. University principals and other stakeholders were also informed of progress. There was direct contact with the office of the ANC, which had been unbanned as a result of then President FW de Klerk's speech in Parliament in February 1990, as well as the scientific representatives of the other political parties.

Facilitating committee: Further evolution of the basic nature of the proposed academy

In April 1991, the planning committee handed over the reins to a larger facilitating committee, whose role would be to seek financing for the establishment and running of a secretariat for the academy (the FRD had until that point provided bridging finance for the initial meetings). The committee would oversee the implementation of the plan, the drafting of the constitution for the proposed academy and the facilitation of the procedure by which the initial members would be elected.

> *"In view of prior existence of three academies – the Royal Society of South Africa, the Suid-Afrikaanse Akademie vir Wetenskap en Kuns, and the Science and Engineering Academy of South Africa – the group was of the opinion that the direct involvement and support of these bodies should be sought in the first instance. This was to lessen or eliminate the possibility of future conflict over organisational roles and functions, and provides much the best chance for general legitimacy to be accorded the new academy at the critical initial stage of its existence." – ASSAf Founder Member Prof Wieland Gevers, February 2015*

The planning committee suggested that an appropriate first step would be the nomination by each of these three bodies of 12 outstanding persons unequivocally recognised by them as fine scientists with leadership qualities. Such nomination needed to be restricted to the members of the particular body concerned. These persons would constitute a facilitating committee, elect a temporary chairperson, draw up a detailed draft constitution for the academy and select a suitable name.

The facilitating committee comprised eminent scientists, as well as those who had made a 'contribution to science'. The committee had the power to co-opt new members and consult with relevant people who were not necessarily members of the three existing academies. This also allowed the committee to address any imbalances. The committee was required to think through the first election process and spell out the details in the draft constitution.

Facilitating committee members

Dr Louw Alberts	Dr Reinhard Arndt	Dr Andries (AJ) Brink	Dr Brian Clark
Prof George Ellis	Prof JA de Bruyn	Dr Ania Grobicki	Dr Chris Garbers
Dr Johan Garber	Prof Wieland Gevers	Prof CT Johnson	Dr AJ Kgomo
Dr Raymond Loubser	Dr Gideon Louw	Prof D Mitchell	Prof Frank Nabarro
Mr Eugene Nyati	Prof HJ Potgieter	Prof Daya Reddy	Prof Bob Seretlo
Dr Gordon Sibiya	Dr Cynthia Sikakana	Dr Marian Tredoux	Prof Dingie Janse van Rensburg
Prof Daan van Wyk	Prof SJ Zondi	Dr HB Dyer	Prof DM Joubert
Prof MC Mehl	Prof Wiseman Nkuhlu	Prof Friedel Sellschop	Prof P Smit
Prof AJ Thembela	Prof Jennifer Thomson	Prof Philip Tobias	

The committee was constituted after the necessary nominations of its 35 members had been completed. It met a number of times during the next three years, convened by Arndt with secretarial service provided by Hannekie Botha of the FRD. Its main initial focus was on reaching final agreement on key features of the proposed new academy. The facilitating committee unanimously accepted the 'plan' put forward by the planning committee and in so doing accepted the sequence of future actions set out in the establishment of a unitary academy of sciences.

After much debate (at times so strident that the overall process was almost jeopardised), there was finally 'sufficient consensus' (a term borrowed from the concurrent CODESA talks between the then National Party government and the ANC) on a number of issues.

The new academy would not replace any or all of the three existing bodies, but would seek an operating terrain not occupied by these already (a tall order at the time, but fortunately solved quite soon in the course of ASSAf's evolution). A corollary of this arrangement was that the existing 'academies' would continue to operate in a 'multi-academy' situation as obtained in a number of other countries such as Germany and New Zealand.

Statutory recognition

The academy would seek statutory recognition in due course, but would initially be a 'voluntary association'.

It would be an autonomous body corporate with perpetual succession and legal personality. The expectation was that it would articulate scientific viewpoints, information and thinking within the scientific community. The group anticipated that it would become a

valuable source of advice on matters of government science and technology policy. It was suggested that the academy be established under its own dedicated legislation to provide full clarity regarding its functions and provide the basis for the openness and transparency of its activities. The academy would thereby become known to the public at large.

As a body corporate with perpetual succession and legal personality sanctioned by an Act of Parliament, it would enjoy international acceptance and credibility as its reputation would be thus recognised. Statutory recognition would ensure that the constitution or objectives cannot be changed at will.

Broad in scope, including all disciplines

The academy would be broad in its scope, including **all disciplines which use empirical approaches in adding to knowledge**. This would allow the academy to leapfrog to modernity over the historical association of 'science academies' within the natural sciences, as exemplified by the RSSAf in this country and the majority of well-established exemplars worldwide. The worthy intention was to be a source of trouble in later stages of the academy's development (See Chapter 8), since the input into its creation had been largely made by scholars who were not associated with the humanities or social sciences, and many of whom had been opposed to the inclusion of the latter domains of knowledge, favouring a restriction to 'science and technology'.

> *"We were able to have key debates that other academies are still having about the humanities, and about including disciplines on the grounds that they were empirical in nature, whether it was education, law or theology. As long as you didn't have a prejudice or pre-set idea of what you were going to come up with. As long as your scholarship was designed to find out something, your discipline would be included." – ASSAf Founder Member Prof Wieland Gevers, July 2015*

ASSAf's first General Secretary Makgoba explains that, "We had the RSSAf at the time, whose members were outstanding scientists, the *SAAWK* too had respected people and scientists as members and the smaller SEASA also had respected people on board. But the new academy was not just about bringing together the existing academies, the driving concept was also about broadening the work of an academy of science to, for example, include the social sciences and humanities. The proposed academy would be more than a home for the natural or pure sciences; it also had to be a home for scholars in literature and political science and any of the other scholarly fields. I was very supportive of that."

"That broader interpretation of scholarship is a lingering legacy of what we tried to achieve in those early days. I was moving in African circles and this was something new and all felt like they could participate in that."

Harnessing distinctive powers of disciplines to address societal problems

ASSAf adopted in its name the term 'science' (not the more usual 'sciences') in the singular as reflecting a common way of enquiring rather than an aggregation of different

disciplines. Its Members are elected on the basis of a combination of two principal criteria, academic excellence and significant contributions to society.

After the Academy was launched, there were ongoing disputes over the inclusion of the humanities and social sciences. In an attempt to diffuse the situation, Gevers delivered an ASSAf presidential lecture entitled 'Science' or 'Sciences': The Difference One Letter Makes during his tenure as head of the Academy. The lecture was subsequently printed in the *SAJS*. But despite these efforts the debate is still resurrected from time to time.

> *"The inclusion of all the 'sciences' in ASSAf at its birth in 1996 could easily (and logically) have led to the adoption of the plural form of 'science' in its title. It did not, because a few of the sponsors and constitution drafters (and I plead guilty to having been the most emphatic of them) preferred the route already taken by the two leading multidisciplinary journals, namely to use 'science' in the singular as including all the scientific disciplines (that is, all disciplines that accumulate their 'wisdom' by requiring their practitioners to plan and labour to obtain evidence, and use that evidence to support or eliminate hypotheses derived from previously available evidence and/or intuition)." – ASSAf Founder Member Prof Wieland Gevers, 2015*

ASSAf successfully discarded the viewpoint that regarded the word 'science' as synonymous with 'natural science' or 'hard science', the preserve of people who view themselves as the only 'proper' scientists. Yet another rejected approach was to regard science academies as merely bringing under one privileged roof a number of different disciplines ('the sciences'), all constituting separately communities in each of which the constituent brains have 'constructed' themselves irreversibly into a unique mode of thought. (Gevers, 2016)

ASSAf, after considerable debate, and at some risk to its evolving support base, opted for the standpoint that a national 'science academy' should basically be devoted to the promotion and utilisation of the open-ended and evidence-based way of enquiry that is common to all empirical disciplines (hence ASSAf would be an Academy of 'Science', not of 'Sciences'). This approach meant that the distinctive powers of many disciplines would be harnessed to common purpose, at the highest level, to address societal problems – the principal mission of the organisation.

The principle also made it logical (although still internationally unique) that elective Membership of ASSAf would be based on the double criteria of excellence in science (across the entire disciplinary spectrum) and success in applying such high-level scientific thought for the benefit of society; it was thought that such scholars would find it easier to cross boundaries and relate to one another in a mutually respectful manner in a volunteer system of joint intellectual service. The Academy consistently described the Members as the core asset of the body.

Persons elected to the Academy would be known as 'Members', not 'Fellows' as the latter was seemed to be a poorly translatable term in a multi-lingual country.

A Constitution is agreed

The next step of the facilitating committee was to craft a Constitution for the Academy. The drafting was entrusted to a team headed by Gevers, and a great deal of discussion was required to reach consensus on its provisions, with the late Prof Frank Nabarro prominent in the process.

In addition to the Constitution, an 'Annexure' was agreed spelling out the proposed procedures for electing 100 Founding Members, in two phases.

The ASSAf Constitution is available on www.assaf.org.za.

Nominees raise their concerns

After the adoption of the draft Constitution, the plan for the two-stage election of 100 Founder Members of the new Academy was administered, as prescribed, by an elected interim nominations committee consisting of five members.

The facilitating committee was also required to discuss the draft Constitution with the three existing 'academies' and to make every effort to reach agreement with them on its implementation before election of the first Members. The facilitating committee was to be dissolved just prior to the inaugural meeting of the new Academy.

A number of people on the facilitating committee encountered difficulties when canvassing prospective nominees. These difficulties arose partly from ignorance about the Academy initiatives, mostly reflecting the lack of an extensive 'bottom-up' consultative process before the plan was developed. Uncertainties had also been encountered arising from the position of the new Academy in a time of transition, its relationship in the future to existing academies and related organisations, and its general acceptability in the 'joint forum' approach now widely used to prevent unilateral restructuring and to increase accountability and participatory democracy in areas of national importance.

100 Founder Members are elected in a two-stage process

Once the Constitution had been agreed upon, the next milestone to be achieved was the election as prescribed in the plan. A two-stage election of 100 Founder Members of the new academy would be administered by an elected interim nomination committee. A facilitating committee would **elect the first Members, not more than 60**. The facilitating committee members were not eligible for the initial election, but could be elected subsequently. These processes brought the **total of substantive Members to 100,** to form the foundation Membership, which would elect the first President and office-bearers.

In 1995, 106 Founder Members were elected. In alphabetical order, they are:

Founder Members

Dr L Alberts, Dr RR Arndt, Prof K Baruth-Ram, Prof AC Bawa, Prof SR Benatar, Prof KD Bhoola, Prof GE Blight, Prof JCA Booyens, Prof CK Brain, Prof G Branch, Dr AJ Brink, Prof CH Brink, Prof MN Bruton, Prof JR Bull, Dr AP Burger, Prof WT Claassen, Dr JB Clark, Dr NR Comins, Prof HM Coovadia, Prof CF Cresswell, Prof RM Crewe, Prof JA de Bruyn, Prof MJ de Wit, Dr AA Eberhard, Prof GFR Ellis, Dr BL Fanaroff, Prof MW Feast, Prof JG Field, Prof RF Fuggle, Dr CF Garbers, Dr JG Garbers, Prof J Gerwel, Prof W Gevers, Prof RJ Haines, Prof RG Harley, Dr HS Hofmeyr, Dr DH Jacobson, Prof T Jenkins, Prof CT Johnson, Prof E Kahn, Prof B Khotseng, Prof R Lemmer, Dr RS Loubser, Dr GN Louw, Prof C Madiba, Prof S Maimela, Prof MW Makgoba, Prof JAG Malherbe, Dr NC Manganyi, Prof TV Maphai, Prof JB Martin, Dr A Mbewu, Prof D Mitchell, Prof V Mizrahi, Prof VC Moran, Dr K Mokhele, Prof IJ Mosala, Prof C Mynhardt, Prof VM Mzamane, Prof N Mzamanae, Prof FRN Nabarro, Prof N Ndebele, Prof PE Ngoepe, Prof W Nhuhlu, Prof CT O'Connor, Prof GN Padayachee, Prof M Parker, Dr AW Patterson, Prof HJ Potgieter, Dr OW Prozesky, Dr MA Ramphele, Prof D Rawlings, Prof BD Reddy, Prof J Reddy, Prof CJ Reinecke, Prof FP Retief, Dr SJ Saunders, Prof L Schlemmer, Prof CJH Schutte, Prof JPF Sellschop, Prof JR Seretlo, Prof LV Shannon, Dr O Shisana, Prof R Siegried, Prof A Small, Prof P Smit, Prof HC Snyman, Prof FA Sonn, Prof PS Steyn, Prof PH Stoker, Prof JA Thomson, Prof PV Tobias, Prof PD Tyson, Prof HCJ van Rensburg, Prof N van Schaik, Prof J van Staden, Prof JD van Wyk, Prof J van Zyl, Dr DW Verwoerd, Dr G von Gruenewaldt, Prof ADM Walker, Prof B Warner, Prof M Wichers, Prof F Wilson, Prof DR Woods, and Prof MM Zulu.

A natural bias in Membership arose because the RSSAf Fellows were mainly English-speaking and white, their members – drawn purely from natural science – nominated candidates. SEASA was natural-science focused, so the candidates nominated from within its ranks were drawn from natural science and engineering. In fact, its leader thought explicitly there should be no humanities people in the new Academy.

Things turned sour for SEASA during the nomination process. Sibiya and SEASA had the right to nominate from within their ranks, but did not do so. Sibiya wanted the members

of SEASA to automatically qualify for Membership of the new academy. But academies of science are elected bodies. It was at this point that SEASA distanced itself from the process.

The only body that was freely nominating scholars from the human and social sciences was the primarily white, Afrikaans-speaking *Akademie*.

SAAWK expressed concern over the fact that natural scientists dominated the group of Founder Members. The *Akademie* also expressed concern that the number of Afrikaans-speaking scientists being elected was extremely low. Meanwhile SEASA accused the new body of being a "clique of English-speaking scientists who meticulously hijacked the academy and turned it into an elitist forum for white liberal academics".

The humanities scholars in the country, who were never part of any of the existing academies would say "look, there is a self-perpetuating bias in this process". The new body kicked off with a dominance in natural science, medicine, etc., and because it is only Members who are nominators and voters, this bias would continue over time.

In Africa generally, science academies have been natural science bodies; that is true in Nigeria, Kenya and others, as well as in the case of the African Academy of Sciences. The continental tradition and emphasis has been on natural science. Only Ghana has an Academy of Arts and Sciences.

> *"It was a historical accident that Membership was skewed. So we set out explicitly to encourage people to nominate Members from the social sciences and humanities to break this stranglehold. We set out deliberately at each election to encourage Members to nominate under-represented disciplines, thereby hoping to gradually overcome this bias." – ASSAf Founder Member Prof Wieland Gevers, July 2015*

Despite the polemics, preparations for the launch proceeded, driven by a committed group of individuals determined to see the realisation of a truly national, unified academy of science.

An interim council and inaugural committee planned the launch for February 1996, but eager to have President Mandela's participation at the celebrations, they shifted the date to March to fit in with his schedule. It was confirmed that President Mandela would host the launch event at his residence in Pretoria.

The Founder Members, higher education leaders, presidents of science councils, academia, representatives of scientific societies, key members of cabinet and select committees of Parliament, directors-general and presidents of academies around the world were invited to attend the dinner and participate in the workshop the next day. Both sessions of the workshop would be open to non-members of the academy.

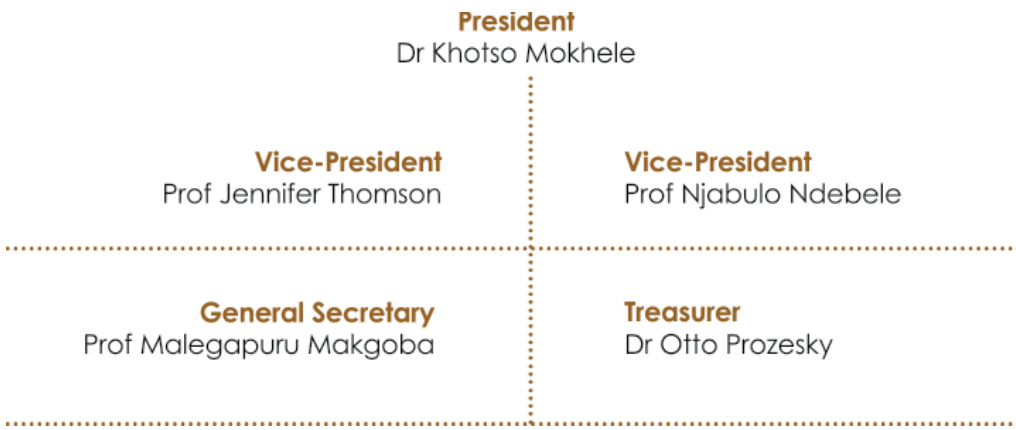
Unfortunately the European Academy of Science was meeting in Budapest, Hungary the same day and as a result a number of presidents of European academies were unable to attend the launch in South Africa.

Chapter 3: The Academy of Science of South Africa is Launched in March 1996

In 1989, an urgent need was identified for an academy of science that could serve the broad South African community through science, convince the South African community of its non-sectoral nature, engender the respect of all South Africans, and be accepted by academies of science abroad as the national academy of science of South Africa. After six years of preparations, the new Academy was finally established as a voluntary association in 1996.

In March 1996 the Academy of Science of South Africa (ASSAf) was inaugurated as a product of the initiative and efforts of the three existing academies, even though SEA-SA had disassociated itself from the initiative shortly before the inauguration. Dr Khotso Mokhele was elected as its first President, along with office-bearers and Council Members. Mokhele was also appointed as the first black President of the FRD later in the same year, taking over the reins from the retiring Dr Reinhard Arndt.

First office-bearers 1998 – 2000



The Council Members were Prof Reinhard Arndt, Prof Ahmed Bawa, Prof Walter Claassen, Prof George Ellis, Prof Jakes Gerwel, Prof Wieland Gevers, Prof Ron Harley, Dr Mamphela Ramphele, Prof Friedel Sellschop, Dr Olive Shisana, Prof Peter Tyson, Prof David Woods (resigned as Council Member on 24 May 1997) and Prof Christopher Saunders (resigned as Council Member on 24 May 1997).

Mokhele would be supported by two Vice-Presidents, Prof Njabulo Ndebele of the University of the North and Prof Jennifer Thomson of the University of Cape Town (UCT). Ndebele did not remain in office for his full term and resigned as Vice-President and Council Member on 24 May 1997.

The full list of ASSAf office-bearers of ASSAf 1996 – 2016 is provided as Appendix A.

A spot is secured in President Mandela's diary

In an absolute coup, the Academy managed to secure a spot in the diary of the first democratically elected President of South Africa, the nation's beloved Nelson Rolihlahla Mandela, who was also the Academy's patron. Mandela would inaugurate the Academy on the evening of 22 March 1996 and host the dinner to celebrate the occasion.

A two-day inaugural meeting on 22 and 23 March 1996 heralded the birth of ASSAf. Prof Doug Rawlings, with great foresight, kept his copy of the programme and agendas for the two-day inaugural meeting and the following information was gleaned from these documents.

Day one was set aside for the first business meeting of the Academy to be attended by Founder Members only. At the constitutional assembly, which was held at the University of Pretoria (UP) Conference Centre, the ASSAf Constitution was circulated. As convenor of the interim council, Mokhele gave a brief report on matters pertaining to the Constitution, while Arndt, as chairperson of the facilitating committee, sketched the background to the development of ASSAf. Gevers who had played a key role in drafting the Constitution reported on the key features of the document. The assembly made inputs and these amendments and refinements were debated, agreed upon and duly recorded.

After lunch the first office-bearers were elected and shortly thereafter, they were introduced to the media at a press conference.

In the afternoon, at the first general meeting, chaired by the newly elected President of the Academy, delegates discussed the task facing the Academy, the legal status of the Academy and its financial strategy. It was also determined that the South African President would be invited to be the patron of the new Academy.

In the evening, the Founder Members and invited guests gathered at the President of South Africa's Pretoria residence to celebrate the launch of ASSAf. The world's leading scientists applauded South Africa for launching a unitary academy of science and wished it well.

> **Address by President Nelson Mandela on the Inauguration of the Academy of Science of South Africa, 22 March 1996**
>
> *"President of the Academy of Science of South Africa; Minister Ngubane; Founding Members of the Academy; Distinguished Guests; Ladies and Gentlemen.*
>
> *I am delighted and deeply honoured to share in the founding of the Academy of Science of South Africa with such distinguished leaders of science.*
>
> *This new birth comes only weeks before the second anniversary of the day on which the people of South Africa inaugurated their freedom and began working together to build a new nation.*
>
> *That context reminds us that tonight's inauguration is not an isolated act, but part of the building of a new society which freedom has made possible. This fact*

should divest the occasion of mere symbolism. We live in a period which challenges science to define its role and assume its place in our emerging nation.

None of us will need to be persuaded of the utility of science to national growth and prosperity. But neither will we need to be reminded of its capacity to lend itself to destruction and repression. Whether knowledge is used for good or evil depends on the goals to which we aspire and the decisions we make, as government, as scientists and as ordinary citizens.

The institution being established tonight has, therefore, the potential to play a critical role in the development of both science and the nation as a whole.

The establishment of the Academy at this critical moment, with the noble objective of promoting and applying scientific thinking in the service of society, does also have its risks.

On the one hand, the creation of an academy of sciences obeys a commendable, indeed essential, ideal; namely, more efficient management of the sciences as a national asset. On the other hand, the advancement of knowledge does also depend on scientific activity that is unfettered by the demands of immediate and pre-defined missions.

The challenge will be to find the right balance between activities aimed at producing useful results in the short-term and those which may not produce applications for decades.

Wherever South Africa finds that balance, science will draw its sustenance from a partnership with government and the business sector aimed at the application and advancement of knowledge in the achievement of our national goals.

South Africa's first democratic government has given concrete and practical effect to its high regard for science by establishing the country's first Ministry of Science and Technology. Its mandate includes a far-reaching transformation of our science and technology system, in order to bring knowledge to bear in promoting growth and development to improve the quality of life of all South Africans.

The outline of the new system is taking shape with the widest consultation; the draft White Paper soon to be published will provide the opportunity for further public debate. No doubt the Academy will make its voice heard to the benefit of the whole country.

The eagerness for change within the system is reflected, amongst other things, in the promptness with which research councils have undertaken interim restructuring of their governing bodies, to make them more representative and more responsive to social needs.

Our business sector is also proving eager to leave behind a period in which economic protection and heavy dependence on defence-oriented research inhib-

ited innovation. This will be essential as we set about building an economy that is internationally competitive.

The scientific community can therefore be assured of a sustaining and challenging call upon its services. But the quality of its response, the very life and vigour of science, engineering and technology in South Africa, will depend on the community itself.

This is the challenge which the Academy has defined for itself. Its authority will not derive from any law or statue but on the results of its work.

The presence here tonight of so many eminent figures of international science and science policy gives practical expression to a vital aspect of the Academy's work.

May I take this opportunity to welcome our distinguished visitors, and thank you for your interest in the future of South African science. Its health in this era of globalisation depends critically on exchange of ideas and collaboration in research across national and cultural boundaries.

The Academy should in particular also facilitate co-operation between South African scientists and other African scientists, and the sharing of our skills and technology base as a continent. This would lend strength to continental efforts towards economic co-operation and development.

Without diminishing the importance of fundamental research, the Academy's success will also depend on how effectively it promotes the application of knowledge to our people's most urgent basic needs.

The practical orientation of your founding conference is therefore most commendable, with its focus on Education and Health. Investment in people, of which education and health care are vital components, is key to improving well-being and to generating sustained growth and competitiveness.

In concluding I would like to touch on what I believe to be one of the most important gifts which the Academy could bestow on our emerging nation.

South Africa's need for rapid expansion of its scientific and technological skills is immense. It is inhibited by the disastrous restriction which apartheid imposed on the level of scientific and technological education: and by an image of science tarnished in the eyes of the majority by associations with the past.

On your shoulders rests the challenge of giving science a face that inspires our youth to seek our science, engineering and technology.

But it requires more. It also means orienting science in a practical and visible way towards helping meet basic needs. It means recognising the intellectual chal-

lenge of applying knowledge to meeting such needs, rewarding achievements in that direction and celebrating them with the highest honours.

The New Patriotism which is abroad in South Africa is rooted in our progress in overcoming the legacy of our past – esteem for South African science ought to become part of that national pride.

I thank you."

Source: Nelson Mandela Foundation

The President of the Royal Society, Sir Aaron Klug, brought greetings from London and presented ASSAf with a scroll bearing a message of congratulations. The scroll reads: "The Society warmly endorses the creation of a true and unitary Academy of Science of South Africa to represent the new South Africa in the community of world academies of science and looks forward to working with the new Academy to promote the advancement of science and technology both nationally and internationally".

Klug, representing the oldest scientific society in the world, which has had a continuous existence, congratulated Mokhele, the first President of ASSAf on his election and presented him with the scroll.

The following morning it was back to work. Delegates gathered for the scientific session at the UP Conference Centre. The keynote address was delivered by Klug. This was followed by a session on education, chaired by Director-General in the Office of the President Dr Jakes Gerwel. Prof Chabani Manganyi of the Department of Education delivered the invited paper, while US NAS Foreign Secretary Prof F Sherwood Rowland and Caribbean Academy of Sciences President Prof Harold Ramkissoon responded. The health session was chaired by Prozesky in his capacity as MRC President. *South African Medical Journal* editor, Dr Dan Ncayiyana, delivered the invited paper. The respondents on this occasion were Dr Ullrich Hoffmeyer of National Economic Research Associates in London and Dr George Veliotes of the Medical Association of South Africa.

These discussions and workshops set the foundation for further work in setting up the new Academy.

At the first meeting, I was elected as the President of the Academy, together with other new office-bearers and Council. I accepted the responsibility of serving on the new Council of ASSAf, motivated by the ideals of an inclusive academy that values excellence in science and scholarship. I was hoping for an academy that would go beyond science understood as natural science only – one that embraced excellence in all fields of science including social science, economics, as well as excellence in other walks of life such as law and engineering." – First ASSAf President Dr Khotso Mokhele, 25 September 2014

Mokhele says the Academy has made significant strides in its short lifespan, but he is disappointed that some of its processes have delayed its potential to make a great contribution to addressing the challenges facing the country. "Such processes include the election criteria, where Members can vote for or against candidates. These criteria have

been a barrier to the Academy redressing the imbalances in Membership in terms of race, gender and disciplines."

Scientific thinking for the good of society

When it was launched, the key objective of the Academy was to promote and apply scientific thinking in service of society. The common ground of scientific knowledge and activity would be used to remove barriers between people and obstacles to ensure the full development of their intellectual capacity.

> *While the Academy of Science will be fearless in its principal mission to serve the community, it aims above all to harness the minds and energies of the most able practitioners of scientific thought in the country." – ASSAf Founder Member Dr Reinhard Arndt speaking at the launch of ASSAf, March 1996*

The Academy would aspire to inspire, promote and recognise excellence in scientific and technical practice; and investigate and publicly report on various matters, at its own discretion or at the request of government or organisations in civil society, in order to promote and apply scientific thinking in the service of society.

The first year was primarily devoted to establishing the Academy. The two issues that clearly crystallised as critical to the proper working of the Academy were:

- the Academy bill that was waiting to be passed,
- and the establishment of a secretariat, an issue that was debated by Council *ad nauseum*.

In addition, Council Members spent time compiling documentation for generic issues related to an academy. Seminars were planned but did not take place at that time. During the course of year one, one of the Vice-Presidents and other Council Members resigned because of over-commitment to other pressing national issues.

The Academy was being established during a period of competing national priorities such as education, housing and primary health care. In the light of these issues, the Academy could have been seen to be a luxury to the nation. But the Council and some ordinary Members were convinced of the value of the Academy to society and kept working hard to get it up and running in the knowledge that an academy of science can result in the more efficient management of the sciences as a national asset.

ASSAf's first General Secretary Makgoba commented at the time that impatience among some Members and a lack of understanding of the competing, legitimate issues facing some of the decision-makers was disheartening.

> *Some Members of the Academy want to enter heaven without dying." – First ASSAf General Secretary Prof Malegapuru Makgoba, October 1997*

"Some Members of the Academy seem to think that one can wave a magic wand and things will happen. The process of consultation in the present environment can be debili-

tating. They need to understand that even Council Members do not devote 100% of their time to Academy issues and projects. Participation at the level of Members is also disappointing. Until they recognise that their participation is what constitutes an academy of science, then we will continue to assume that the President or General Secretary is the Academy."

> *Trying to establish a vigorous Academy is a major challenge to all of us. Let us not underestimate the task, the competing elements and equally the undermining factors that are currently within our midst within government, stakeholders and other academies. Finally, without a full-time secretariat, I will not continue as General Secretary of the Academy." – First ASSAf General Secretary Prof Malegapuru Makgoba, October 1997*

The Treasurer, Prozesky, former RSSAf President and former CSIR board member drew up a financial plan for the Academy. This was presented to and accepted by Council. A report on the financial plan was then presented at the 1997 ASSAf AGM.

Founder Member Prof Iqbal Parker recalls how a lot of the activities were based around simply getting the Academy established. The Council of ASSAf held a workshop in November 1997 to reflect on the impediments to the vitalisation of ASSAf since its establishment. The Council proposed a *bosberaad* of the Councils of the three academies to discuss how the RSSAf and *SAAWK* could assist ASSAf to become an effective academy of science in South Africa.

The embryonic Academy does some soul-searching

Progress in getting the new Academy to become functional was undeniably slow during the first term of the ASSAf Council. The main reasons were the lack of funding and infrastructure, and the pre-occupation with the positioning of the young Academy in relation to government.

Parker recalls how, in the early days, the Academy did not have a home. It was located in the offices of various other bodies including the FRD/National Research Foundation (NRF) and the CSIR. The Academy did not have a permanent address. "You knew who the President was and the General Secretary and if you wanted to contact the Academy you would contact the office-bearers at their respective institutions."

In 1996, the Council of ASSAf asked respected academic Dr Njabulo Ndebele – at the time from the University of the North and currently the Chancellor of the University of Johannesburg (UJ) – to share his thoughts on the role of the Academy in national life. Ndebele submitted a discussion document entitled The Role of the Academy of Science in South Africa, which set out to be provocative, posing questions rather than suggesting answers.

The apartheid era was characterised by a structure of hierarchies and the legislated parallel development of its various communities. Horizontal interaction between racial and ethnic groupings was discouraged. "This engendered an analytical epistemology with its tendency to break up and divide phenomena into constituent parts", explained Ndebele. "It emphasised differences rather than similarities; isolation over interaction; as

well as description and definition over interpretation." Accordingly he said knowledge was rigorously structured into discrete disciplines with mechanisms to control the crossing of boundaries.

He was however encouraging of the bright future that lay ahead for the Academy.

"Our society is moving away from parallel development towards horizontal interaction; from repression towards expression; from secrecy towards revelation and exposure; from analytical towards integrative modes of thinking. This is a major shift towards an integrated epistemology and relational coherence. This will enable us to remove barriers between knowledge disciplines and fully develop intellectual activity."

> *In choosing to be an Academy for all disciplines of knowledge, we have made an apt and strategically relevant choice. Where initially this choice may have been driven by valid political considerations, we now need to lay the foundation for our activities." – ASSAf Founder Member Dr Njabulo Ndebele, May 1996*

Ndebele suggested the country needed to allow full expression of the enormous human energies released by democracy. It needed to harness them for sustainable creativity, not only as a political objective, but also as an intellectual objective.

> *It may even be that the Academy is the only body that may play a major, historic role in enabling our intellectual culture to develop a unique character in the transitional stage. The Academy is to my knowledge the only formal, multidisciplinary body organised at national level, presenting it with immense possibilities." – ASSAf Founder Member Dr Njabulo Ndebele, May 1996*

In his document, Ndebele proposed a conference to comprehend the social complexity of South Africa and to pose questions and suggest ways by which answers could be sought. He felt the role of the Academy may better emerge after such an exercise.

Early in 1997, *SAAWK* President Prof Francois Retief expressed his opinion in the *SA Tydskrif vir Natuurwetenskap en Tegnologie*, stating that despite the fact that the new Academy was still trying to find its feet, to its credit it had in its ranks a large number of black scientists who to date had not belonged to either the Royal Society of South Africa (RSSAf) nor the *Akademie* (this was after the Science and Engineering Academy of South Africa or SEASA had withdrawn from the process).

> *At this point there are stiff financial and administrative challenges, but this is to be expected with a new entity trying to find its feet alongside established sister institutions. The Council of ASSAf comprises expert and enthusiastic Members who are representative of the broad South African science scene. However, it is extremely important that ASSAf not allow itself to become a political football." – Suid-Afrikaanse Akademie vir Wetenskap en Kuns President Prof Francois Retief, February 1997*

Retief also warned that although the new Academy had selected English as its medium of communication, it would at some point have to take a stand regarding Afrikaans and the other emerging indigenous scientific languages. All documents of the Academy so

far had been written in English. It was envisaged that the Academy would fall in with national policies as these are developed in South Africa.

In 2002, the late Prof Jakes Gerwel, an ASSAf Founder Member drafted a report to the Minister of Education, Dr Kader Asmal, on the position of Afrikaans in the university system. In this report Gerwel makes a strong case for multilingualism and suggests active development of all South African languages in such a manner that they can be used in all high status functions. "In conjunction with such a scheme ASSAf may be requested to explore what role language academies could play in the development of multilingualism." added Gerwel. (Today, like most entities across the country, ASSAf still communicates primarily in English, although in 2014, the DST announced a new language policy based on the *Use of Official Languages Act, 2012* as part of a process towards multilingualism.)

In 1997, ASSAf Founder Member and physicist Prof Frank Nabarro penned his *Academy of Science of South Africa: Reflections on our first year*. In the document Nabarro celebrated the successful launch of the Academy but rued the lack of a permanent home, a regular funding source and a secretariat.

> *Attendance at Council meetings has been poor, two Members have resigned from Council and one Member has resigned from the Academy already because it has not met his expectations of a vibrant scientific body. It's true, the Academy has not been effective, but we need not be dismayed by what has undoubtedly been a slow start. Many of the world's leading academies have experienced extended incubation periods. However, we need to examine the functions and structures of existing academies to nurture ASSAf and ensure its success." – ASSAf Founder Member Prof Frank Nabarro, 1997*

Nabarro suggested examining the functions and structures of the US NAS and the Royal Society of London, in order to build up the structure and assume a leadership role in South Africa and on the continent.

> *The Academy of Science of South Africa will always be smaller than the US NAS and the RS, and may not be directly involved in world leadership in science. Nevertheless, we are the major scientific body on the African continent and Africa looks to us for leadership, as the world looks to the US NAS and Royal Society for leadership." – ASSAf Founder Member Prof Frank Nabarro, 1997*

Nabarro called for the appointment of a secretariat and for negotiations with private sources for a permanent building to locate the Academy and with government to secure running funds. He realised early on that this was going to make or break the success of this fledgling institution.

> *The Council is democratically elected, but should use its power of co-option during the next year to seek out the few Members who have the necessary qualifications to become active officers. We should be planning actively to have this in place by the time the Academy has completed its second year of existence." – ASSAf Founder Member Prof Frank Nabarro, 1997*

Shortly thereafter, in October 1997, ASSAf's first General Secretary, Prof Malegapuru William Makgoba, submitted his reflections on the Academy and pulled no punches in his call for a full-time secretariat as well. In fact, he stated clearly that without a full-time secretariat, he would not be willing to continue to serve as General Secretary! The then youthful, Makgoba – subsequently the founding Vice-Chancellor of the merged UKZN, President of the MRC and 'quintessential African scholar' – saw as the primary objective of the General Secretary, the completion of the Act of the Academy of Science of South Africa. (Mnganga, 2014)

> *During the first general meeting, it was unanimously decided that the Academy seeks to exist as a legal entity through an Act of Parliament. It was also stressed that the Academy seeks to be independent. The latter wish is embedded in the Academy's constitution." – First ASSAf General Secretary Prof Malegapuru Makgoba, October 1997*

In his submission, Makgoba adds, "Our wish was bolstered when at the inauguration dinner, the then Minister of Arts, Culture, Science and Technology, Dr Ben Ngubane, indicated that his department was in the process of drafting legislation in this direction. As it turned out, it was rather more of an intention than a reality.

> *The major objective of the General Secretary is to complete the Act of the Academy. The reasons are simple. As a national Academy, our status in society would be enhanced by an Act of Parliament. We would be able to raise funds from government in competition with other entities, and the Academy would be entitled to a government grant as occurs with other similar bodies internationally." – First ASSAf General Secretary Prof Malegapuru Makgoba, October 1997*

"Makgoba stated emphatically that the Academy would have difficulty getting off the ground unless that legal step was concluded and would just end up being "another association of elites in a society that scorns this concept".

After a series of consultations, two issues became obvious. DACST was not drafting legislation relating to the Academy and SEASA was no longer supporting the establishment of the fact. If anything, it was opposing it. The *Akademie* was vacillating and DACST in the meantime was busy establishing the National Advisory Council on Innovation (NACI) and the NRF bill. These two bodies had implications for the Academy in certain aspects of its mandate and the question even arose "why do we need the Academy when there is NACI"?

Makgoba put it succinctly.

> *The nature of an independent, autonomous Academy outside government seemed to be accepted with a lot of reluctance and trepidation. However, DACST has accepted the idea of sponsoring the act. The President of the Academy Dr Khotso Mokhele and I have held several useful meetings to clarify issues and seek advice from the department in preparing the bill and cabinet memorandum." – First ASSAf General Secretary Prof Malegapuru Makgoba, October 1997*

During their meetings with DACST, the core team drafting the bill – namely Arndt, Gevers and Makgoba – received encouragement and valuable advice. They did however gather that their bill was not a priority in the department's legislation programme and that they would have to shepherd it throughout in order to ensure implementation.

> *Despite a hostile environment, every attempt has been made to provide a blueprint for the Academy's Act that should hopefully be passed in Parliament. The amount of official and unofficial time and energy spent on this issue by the President and General Secretary should not be underestimated." – First ASSAf General Secretary Prof Malegapuru Makgoba, October 1997*

"If government passes the Academy bill," he added, "I believe this aspect of our handicap will be resolved. Most similar bodies, such as the Royal Society in London, run their small infrastructure and secretariat from government sources. An example closer to home is the *Akademie* which receives an annual grant from government, has a full-time secretariat and is a legal body. It functions well. There is no magic about this. The lesson here is pretty simple: get government legitimacy and a grant, and you're up and running."

Reflecting on these early years during an interview in August 2015, Makgoba – recently retired from UKZN and shortly before the announcement of his appointment to the South African President's National Planning Commission – had the following to say.

> *I was the first General Secretary of the Academy and was proud to have helped draft the first Act to go to Parliament to establish the Academy. There were just five or six of us. We put in a lot of work to get this off the ground. When Gordon Sibiya pulled out, it did not mean the end of the project. Institutions are greater than individuals. If any of us had pulled out, the unified Academy would have been formed. Our efforts were not in vain. Today the Academy is still going strong." – First ASSAf General Secretary Prof Malegapuru William Makgoba, August 2015*

A lekgotla is mooted to vitalise the Academy

The Council of ASSAf decided to hold a workshop in November 1997 to reflect on the impediments to the vitalisation of ASSAf since its establishment. It proposed a *lekgotla* of the Councils of the three academies to discuss how the RSSAf and *SAAWK* could assist ASSAf to become an effective national academy of science in South Africa.

Two Members of the Council of ASSAf (Gevers and Prof Ahmed Bawa) were first tasked to develop a document that would form the basis for the discussion at the joint meeting. The delegates at the *lekgotla* (brainstorming session) agreed that the core niche of ASSAf was mobilising scientific thought in inclusively addressing the needs of South African society. Finally, the *lekgotla* reiterated the importance of ASSAf attaining statutory status without delay.

Financial constraints

A science academy requires financial and infrastructural support at an appropriate, sustainable level in order to fulfil its mission and achieve its goals. The founders knew that

statutory recognition could boost income with an annual grant from Parliament. The early Academy also sought funding from international funding agencies and the private sector.

From 1996 until the enactment of the academy of science legislation, ASSAf survived on subscription income only and the generous patronage of the NRF, which covered the costs of Council meetings. It was only later on that the government grant and consensus studies started bringing in additional funds and international bodies entered the picture.

The balancing act that all science academies have to perform

It can be tricky for governments anywhere, and especially in the global South, to lend a high level of financial support to academies of science. Then there is the added complication that the money they pay to a science academy may not necessarily buy the advice they want to hear.

During the formation of ASSAf there was an additional dimension to this balancing act that the new science academy would have to perform. There was an inherent and understandable suspicion in the South African crucible because during apartheid the knowledge base was held by white South Africans. Black South Africans had been deliberately excluded. In the early days of its existence ASSAf was viewed with great suspicion as a body dispensing tainted advice, as a body being used by white academics to seek advantage on the new dispensation. Expertise became a swear word. (Gevers, 2015)

It was natural for the new democratic government to want to get advice from sources they trusted.

Parker was one of the black voices in the early Academy and played a key role in convincing DACST that South Africa needed a unified, independent academy of science.

> *It was nice that we got funding from the then DACST, but there was a misconception that we were one of the statutory councils and must fall in line with government thinking. It took a while to get the message across that we are an independent autonomous body that will give advice that may not be politically correct but will be based on scientific fact. I think DST has come to terms with that." – ASSAf Founder Member Prof Iqbal Parker, July 2015*

When ASSAf was launched in 1996 it was restricted to the peculiarities of the structure of cabinet and demarcations of government departments. Very early on the Academy survived on small grants from DACST alone. In their own way and in order to get kudos, DACST kept the formation of this new body within its own demarcation. It was only when the first big public moment occurred, i.e. when the legislation was presented to Parliament for approval in 2001, that awareness of this new body spread to the other departments, such as of health, communications and agriculture, and beyond.

There was also at the time an addiction to using consultants and Gevers was quoted widely when he made the controversial statement that, in Africa, the way things are done is to give advice to yourself. In other words, you form a committee and panel comprising people who give you the advice you want to hear.

> *In African countries, there is no tradition of science academies being trusted or used. It is a tightrope between being independent and being heard." – ASSAf Founder Member Prof Wieland Gevers*

This too had to do with the inherent suspicion in the crucible in which the new academy was being formed. That was the practice at the time. ASSAf made slow headway by visiting other government departments to explain that the work they do is not limited to natural science and technology and that they can assist in many spheres. The Academy has since fought long and hard battles to prove to government the need for an independent multidisciplinary voice in debates about South African society. The first 20 years of democracy in South Africa have subsequently delivered some noteworthy battles that made headlines in South Africa and around the world. Chapter 9 looks at ASSAf's consensus studies in detail and explores the complex relationship between governments and academies of science.

Commenting during an interview in 2014, ASSAf Founder President Mokhele reiterated that in order for ASSAf to become a national Academy that serves the country, it should continue to move away from being an Academy that promotes narrow scientific views, towards being a truly inclusive Academy that provides evidence-based, independent and multidisciplinary policy advice – an Academy that is responsive to the needs and challenges of the government and the general society and an Academy that does not shy away from tackling controversial issues using an evidence-based approach.

> *The Academy is still young and has a long way to go, but the day will come when every minister and all government departments in South Africa know that the go-to body for unbiased, multi-perspective, peer-reviewed reports and advice is ASSAf." – ASSAf Founder Member Prof Wieland Gevers, 2015*

In most democratic societies, scientists have long played advisory roles to a variety of political entities. In those roles they have shaped policy and regulatory frameworks as members of advisory panels, through expert testimony and as political appointees, and – as a result – have been the target of partisan criticism. In some instances, however, scientists have also interfaced with the political arena in roles even more explicitly focused on advocacy. These efforts have focused on both advocacy for specific investments in science and recommendations on specific applications of science in societal contexts. (Scheufele, 2013)

"Unless we maintain our independence, our advice will not be acceptable to the scientific community nor many other stakeholders, because we would be viewed as being politically biased," adds Parker.

Chapter 4: In Service of Society

The ASSAf Constitution

The ASSAf Constitution, finalised in 1996, outlines the key objective of the Academy as being the promotion and application of scientific thinking in the service of society. To this end, the Academy is designed to use the common ground of scientific knowledge and activity to remove barriers between people and to remove other obstacles in order to facilitate the full development of their intellectual capacity. In addition, the constitution states that ASSAf should:

- Endeavour in every possible way to inspire, promote and recognise excellence in scientific and technical practice.
- Investigate and publicly report on various matters, in its own discretion or at the request of government or organisations in civil society, in order to promote and apply scientific thinking in the service of society.
- Promote science education and a culture of science in the population at large.
- Maintain strict independence while consulting other organisations and individuals in the widest manner possible.
- Endeavour to establish and develop close relations with scientific organisations in South Africa and with similar academies in other countries.
- Take any other action that it may consider as necessary towards the attainment of its key objective.

The preamble to the constitution as adopted in 1996 formalises the way in which this particular Academy is specific to South Africa as well as part of the international 'academy vision'.

> *Scientific thought and activity enrich us profoundly; they empower us to understand and to shape our living environment; they are keys that can open doors to a peaceful and prosperous future. The function of science is to create in a disciplined and systematic way a continuum of coherent, rational and universally valid insights into observable reality in all its various facets. Scientific thinking and knowledge are fundamental to the best work done in the applied natural sciences and in technology, and this applies also to much of the human and social sciences.*
>
> *An academy that effectively harnesses the minds and energies of the most able practitioners of scientific thought, reflects, as almost nothing else does, the strong bonds between scientific disciplines and the unique character of the scientific contribution to the lives of all citizens. The Academy of Science of South Africa is constituted to ensure that leading scientists, acting in concert and across all disciplines, can promote the advancement of science and technology, can provide effective advice and can facilitate appropriate action in relation to the collective needs, threats, opportunities, and challenges of all South Africans." – Preamble to the Constitution of the Academy of Science of South Africa 1996.*

ASSAf received international recognition for its constitution.

> *The facilitating committee has worked long and hard to overcome the problems resulting from a historically fragmented country and to promote reconciliation and must be congratulated on its achievement in arriving at a Constitution on which all could agree." – President of the Royal Society Sir Aaron Klug at the inauguration of the Academy of Science of South Africa, Pretoria, 22 March 1996*

Governance, Membership and elections to ensure continuity

The Academy's activities are guided by the ASSAf Act (*Act 67 of 2001*), as amended by the Science and Technology Laws Amendment Acts (*Act 16 of 2011 and Act 7 of 2014*), and a set of established regulations that collectively comprises the Academy's constitution. Good governance of the Academy is ensured through regular meetings of Council, the execution of Council elections, support of Council meetings and efficient and effective execution of Council resolutions.

The ASSAf Council comprises 13 members, of whom 12 are elected from the Membership and one is appointed by the Minister of Science and Technology as a representative of NACI. The Academy has five office-bearers: the President, two Vice-Presidents, General Secretary and Treasurer.

The appointment of advisors to the ASSAf Council is executed in terms of the Constitution. The Council has three standing committees: an Executive Committee comprising the office-bearers that allows for decision-making on important matters in the intervals between Council meetings; an Audit and Risk Committee, and a Human Resources Committee.

At least four Council meetings are held each year and Council elections have been held every four years with effect from 2012 in accordance with the Science and Technology Laws Amendment Act (*Act 16 of 2011*).

Council members do not receive any remuneration for their involvement in governing the activities of the Academy. Funds are allocated to cover Council members' travel and logistical costs associated with Council and other Academy meetings.

The Academy becomes statutory through an Act of Parliament

There was a need for ASSAf to have its own Parliamentary statute passed by a post-1994 national government in order to reflect a commitment by the country's Parliament – and therefore the nation – to having a national academy of science to play an uncontested, inclusive and publically recognised 'academy role' in a democratic South Africa.

Prior to 1994, there had not been a dedicated government department for arts, culture, science or technology. The newly constituted DACST therefore embarked on extensive consultative processes following its establishment in 1994.

These processes culminated in the White Paper on Arts, Culture and Heritage, and the White Paper on Science and Technology in 1996.

Thereafter DACST turned its attention to introducing the National System of Innovation (NSI) as its policy framework and the establishment of appropriate institutions, such as NACI, to advise the minister on policy and the allocation of funding.

There was also substantial reform of the funding of science institutions such as the NRF and the CSIR. As with all government departments at the time, DACST was drawn into the democratic project and had to play a role in addressing national priorities and transforming the country.

With all these issues to be addressed, DACST had its hands full. Therefore the Council of the Academy put a lot of effort into constantly nurturing its relationship with the department and getting itself onto the DACST agenda.

Realising the importance of legislative recognition, the Academy persisted in its efforts, taking responsibility for drafting the bill and preparing for its passage through Parliament. Even once drafted, the bill had to be shepherded by ASSAf to ensure implementation.

> *"The Academy had a lean period from 1996 until the Act was legislated in 2001. It was really from the moment that the Act came into being that the Academy really started to take off." – ASSAf Founder Member Prof Robin Crewe, 2015*

While a statute was not necessary for government funds to flow to the Academy, the likelihood that funds would in fact flow in an accountable and effective manner was greater when there was a statute on the book.

> *"Throughout this period the ASSAf Council persisted in its emphasis on the need for ASSAf to have its own Parliamentary statute passed by the post-1994 democratic government in order to reflect a commitment by the country's Parliament (and therefore of the nation) to having a national 'Academy of Science' playing a broad 'academy role' with a marked developmental emphasis in South Africa." – ASSAf Founder Member Prof Wieland Gevers, 2015*

Another reason for having a statute was that the 'functional domain' for public science-related policymaking, advice, investigation and analysis, promotion and co-ordination across the lines of social partners had always been very crowded, partly for historical reasons. The drafting of a statute for ASSAf would help to clarify its future niche in the evolving NSI. (Gevers, 2015)

The Council of the Academy appointed ASSAf General Secretary Prof Malegapuru Makgoba, Prof Wieland Gevers and Dr Reinhard Arndt to draft a bill to formalise the establishment of the Academy of Science of South Africa. The bill would be submitted via DACST for consideration by Parliament.

Fortunately for ASSAf, the newly elected, democratic government was in agreement.

A new team takes over the reins

As determined by the constitution of the Academy, after two years all but six positions on the Council have to be vacated and filled by the election of six new members.

When ASSAf President, Dr Khotso Mokhele, and several other Members of the first Council turned their attention to other pressing national priorities, they handed the reins of the fledgling Academy to a new team of office-bearers in 1998. Most active among them were Gevers and Prof Iqbal Parker as President and Treasurer respectively. There were times during this early period, when there was a perception that ASSAf consisted of two people only – Gevers and Parker. But the indomitable pair ignored the criticism and pushed on in the knowledge that – despite poorly attended Council meetings and a lack of infrastructure – the organisation's solid constitution and the promise of statutory recognition would draw increasing numbers of top South African scholars over time.

"There was an extended period of three or four years when Iqbal [Parker] and I were the only two keeping the thing going. The Academy could've died there and then. We had to cajole others into attending Council meetings. We spoke to Dr Rob Adam, as DG of DST at the time, we wrote editorials in the media to promote the Academy, and we did as much advocacy as we could, but there was only so much two busy people with full-time jobs could do." — ASSAf Founder Member Prof Wieland Gevers, July 2015

Mokhele twisted the arm of a reluctant Gevers to serve as the second President. Gevers, a 'vertical' and resourceful, open-minded manager by nature, apparently willing to do anything that needed to be done with the most limited resources, had extensive operational experience. (He was the virtual chief operations officer at UCT, when Vice-Chancellor Dr Mamphela Ramphele instituted fundamental administrative and focus changes in the mid-1990s. He also represented the university sector on the South African national qualifications authority, SAQA, in its founding period, established in the Western Cape the first regional consortium of libraries and higher education institutions, and was the founding President of the South African Biochemical Society.) Gevers relished the challenge of seeing to it that ASSAf would be built, because he was convinced that such a body was badly needed and it would serve useful purposes in both the higher education system and the NSI.

Gevers had a broad range of eclectic interests beyond his field of medicine. As the Deputy Vice-Chancellor responsible for Academic Affairs at UCT he got to know all the faculties and many scholars in the different disciplines. He was well set up to promote the multidisciplinary ideals of the Academy.

Parker was initially elected and assigned the position of Treasurer and Dr Anthony Mbewu the position of General Secretary. After a while it was decided they should swop roles. This was at the time that Gevers and Parker were leading the negotiations to get the bill approved.

I remember the famous quote when Wieland and I walked into the office of the Director-General of Science and Technology, Dr Rob Adam, one day and he quipped, 'Oh here comes the Academy'." – ASSAf Founder Member Prof Iqbal Parker, July 2015

Parker had also, due to his reputation as a leader in biotechnology, travelled extensively internationally with the department, so it was decided he needed to be more hands-on in the process – along with Gevers. Parker worked closely with Dr Ben Ngubane who had a strong belief in and supported the concept of an academy, as well as Lionel Mtshali who was Minister for a brief period.

The small group of champions of the early Academy prevailed, despite suspicion from various quarters, despite a small grant from government and despite apathy among the broader scholarly community. The champions fought for the realisation of the statute and they fought for the continued existence of ASSAf because they believed the idea was so good, it had to be realised. Once government put its weight behind the Academy it started to work and have impact.

Dramatic events in Parliament

Deputy Minister of Arts, Culture, Science and Technology, Brigitte Mabandla, told the National Council of Provinces (NCOP) in 2001 that, "Government has a distinct need for an overarching academy that is the only officially recognised body representing the full spectrum of South African scientists. There are occasions when inputs from scientists are needed from a single, reputable source. In the process of international co-operation, it is often appropriate to enter into co-operation agreements with academies in other countries, for which South Africa needs a local academy that has official status. We expect the Academy of Science of South Africa to meet the needs as mentioned and that the government will productively utilise the Academy to provide advice on policy and strategy."

Speaking at the 16 November 2001 meeting of the NCOP, Chairperson Joyce Kgoali said, "We welcome the formal establishment of the Academy of Science of South Africa. As we know, the Academy has been in existence for a few years, functioning as an unofficial body. It is therefore appropriate that we pay tribute today to those dedicated people who were instrumental in establishing the Academy. We admire their dedication, vision and perseverance. We can today all be proud that through their efforts, an academy of science has been established that is representative of all cultural groups and all scientific disciplines in the country.

"Those Founding Members and, indeed, all Academy Members and all scientists can now look back in satisfaction on their activities over the past years knowing that they have achieved something worthwhile. They will probably be pleased that today this bill is going through one of its final stages in becoming law."

Kgoali assured the Academy of government's moral support to fulfil its obligations. "The Academy's objective of promoting scientific thinking in the country is formidable, given

the small fraction of the population that is scientifically literate at this point in time. We are confident that the Academy will be able to find a niche for itself in the range of activities that need to take place to increase the depth and breadth of understanding of science in South Africa."

> *We look forward to the role that the Academy will play. Here I think about the very important role of promoting research and of producing the Journal of Science. We look forward to their representing this country and interacting with their peers internationally. I must thank everybody for supporting this bill." – Deputy Minister of Arts, Culture, Science and Technology Brigitte Mabandla, 2001*

The Parliament of South Africa unanimously passed the Academy of Science of South Africa bill on 26 October 2001 and simultaneously revoked the *SAAWK* statute. The Academy of Science of South Africa Act (Act 67 of 2001) came into operation on 15 May 2002. Six years after it was established as a voluntary association, ASSAf finally became the official academy of science of the country, the only one recognised by government and the only one representing South Africa in the international community of science academies.

> *Science academies play a valuable role in the science and technology systems of many countries. In South Africa different academies and similar bodies have, until now, furthered the interests of different sections of our scientific community, often very competently. We are now ready to recognise a single representative body as an academy that can embody the interests of all sectors of the scientific community rather than just specific subgroups." – Deputy Minister of Arts, Culture, Science and Technology Brigitte Mabandla, 2001*

Once it became an Act of Parliament, the Academy was allocated the domain of the science system of this country that is characteristically occupied by national science academies. As a legislated Academy, ASSAf could now occupy a unique place in that science system through its self-perpetuating, merit-based composition, its independence, and its commitment to the application of scientific thinking to address the problems of society.

In 2004, the Council of the Academy prepared a new draft of the ASSAf Constitution to ensure it was in harmony with the Act. The Academy of Science of South Africa Act *(Act 67 in 2001)* has been amended twice in subsequent years, by the requirements of the Science and Technology Laws Amendment Acts (*Act 16 of 2011 and Act 7 of 2014*). The Act continues to serve to guide the organisation in all activities.

In its May 2012 *Ministerial Review of the Science, Technology and Innovation Landscape in South Africa* the renamed Department of Science and Technology refers to the establishment of the Academy as one of the **key transformatory changes of the post-1994 science, technology and innovation system**. The department lists "Fostering the growth of the Academy of Science of South Africa" as one of its pioneering initiatives and success-

es. The Academy is seen as key to the department's compelling vision for innovation-driven national economic and social development as articulated in the 1996 White Paper. Science and politics are inextricably linked and the explanations for the blurry boundaries between science and politics are multifaceted and some centuries old. The production of reliable knowledge about the natural world has always been a social and political endeavour.

ASSAf was intended by its founders (and by its parliamentary sponsors) to retain the best of the global academy tradition, but to be of this time and this place. Thus the constitution adopted by the nascent academy reflected an important principle that allowed ASSAf to jettison many out-of-date notions that were still carried forward in the academy tradition by older academies. Amongst these was the idea of academy fellowship or membership being a kind of reward for past academic efforts, a club of 'haves' which looked down on 'have-nots'.

Alone we can do so little; together we can do so much

Helen Keller

Chapter 5: Setting up the Machinery with Help from Friends

As a young organisation ASSAf could now seek to find its rightful, productive place in the science and technology system of South Africa. Having a professional secretariat is critical for the functioning of an academy and having a visionary, insightful and energetic leadership shapes the trajectory of an academy. ASSAf realised early on that it had to be seen by stakeholders as the neutral partner that provides independent and objective advice to the nation.

The early years following the finalisation of the Act saw accelerated growth in Membership, activity and productivity. The Academy appointed an experienced, part-time administrator late in 2001, and it had already become clear that a full-time contract would be needed to meet the requirements in the 2003 – 2004 financial year. There were 201 Members of the Academy by mid-2001.

Funding was always a challenge and the secretariat remained small due to limited funds. Once the Academy of Science of South Africa Act was passed in 2001, the annual grant assisted in making more permanent arrangements for the secretariat.

It was during the early 2000s as well that South Africa, via ASSAf, was approached by US NAS to participate in an African science academies development project to be funded by the Bill & Melinda Gates Foundation. The US NAS were open and encouraging, sharing information and advice freely with ASSAf.

> *The Americans gave us detailed guidance in the early years on how to ensure that our methodologies were sound. They helped us adapt best practice methodologies to South African circumstances and how to be meticulous about implementation thereof." – ASSAf Founder Member Prof Wieland Gevers, July 2015*

The funding from the US NAS – much to the delight of ASSAf – in turn stimulated additional funding and support from the South African government. The Director-General of the then DACST. Dr Rob Adam, felt it was important not to allow the US to have too much influence over ASSAf by being its only major funder and therefore increased the South African government grant.

This increased funding allowed ASSAf to set up the machinery required to become a fully-fledged, working national academy of science.

When on 1 August 2002 DACST was divided into two separate departments – the Department of Arts and Culture (DAC) and DST – ASSAf was presented with a new challenge.

Initially the leaders of the new DST had a very instrumentalist view of science and technology, interpreting it as natural science and technology. The country was on a developmental path and there was a general myth that 'science and technology' (in their limited meaning) were going to build the economy and that the humanities had no role

to play. They had a very limited interest in and belief that the social sciences mattered. The HSRC was in a sense left to do that work. (Gevers, 2015)

DST came around in its thinking and eventually embraced ASSAf's espousal of the idea that all scholarship is linked and reflects different disciplinary views on matters, which are valid but need to be understood together! That thinking has subsequently been followed by the NRF and the science system in general. The HSRC remains an entity of the DST and the department has at various times been led by ministers who are social scientists.

Infrastructure: Striving for a solid base

Members are at all times involved in the activities of the Academy. They propose projects and activities and are informed of developments; they are consulted on statements issued and they elect Council, nominate new Members and vote directly at the AGM. However the need for an appointed staff member to coordinate the functions became increasingly apparent.

In order to adequately manage these affairs, the Academy appointed an experienced administrator at the end of 2001, initially part time, but very soon realising the position was a full-time one. Dr Hennie Smith was appointed to serve as the first Administrator of the Academy and made helpful contributions to the body in its formative stages.

An administrative assistant, responsible for Membership, was appointed in 2002. This brought the staff complement to four, with the other two people, the Editor and Editorial Assistant of the *SAJS* remaining at the NRF offices.

In order to accommodate staff members and centralise activities, ASSAf rented offices on the CSIR campus, benefiting from the security of the CSIR and proximity to the science hub that today houses the CSIR, NRF, DST, the South African National Biodiversity Institute (SANBI), MERAKA, and the Innovation Hub, among others.

Telecommunications and IT infrastructure was set up, with HR and IT support being subcontracted to the NRF. The ASSAf website was used to profile the organisation online and to communicate with stakeholders. The appointment of permanent staff members facilitated better communication between ASSAf and its Members and sound administration of Academy affairs such as Council meetings, the AGM and symposia.

There was continuity in the leadership and Council of ASSAf.

Continuity, infrastructure and staff were the winning combination that would allow the Academy to establish itself as the preferred source for evidence-based science advice on issues of national concern.

Like academies around the globe, ASSAf's other role is to reward excellence. ASSAf manages various prestigious awards in the scientific field. The Minister of Science and Technology Dr Ben Ngubane presented the first two Science-for-Society Gold Medals to Prof Malegapuru Makgoba and Prof Trefor Jenkins in 2002 – Makgoba for his contributions to medical science in South Africa and Jenkins for his work on genetics and medical ethics.

Additional funding started flowing in for projects, such as the DST contract to investigate a *Strategic Approach to Research Publishing in SA*, looking at the *SAJS*; *Quest* the popular science magazine; as well as conducting a consensus study on the topic. A study on *Human S&T Resources for the 21st Century* was completed on behalf of and funded by the NRF. This meant that by the 2004 – 2005 budget year a project officer had to be sought. Many of the activities needed a full-time person to coordinate and manage complex projects spread across the country.

In 2004, ASSAf appointed Dr Xola Mati as a Project Officer to manage the growing responsibilities that accompanied increased funding. Shortly thereafter, Mati became the Projects Director and Study Director of the report on *A Strategic Approach to Research Publishing in South Africa*. Mati would eventually become the Chief Operations Officer of the Academy.

Last, the operational needs of the Academy's infrastructure needed to be covered, including Council meetings, travel, phone and fax and IT, among others.

The outputs achieved through the development of an adequate infrastructure for ASSAf were smooth communication with Members, between ASSAf and other bodies, and proper administration of finances, human resources, Members' affairs and projects. It meant that full records of Members and their achievements and contributions could be kept; elections could be overseen; as well as effective archiving and business processes. There could be proper administration of ASSAf Council meetings, AGMs and symposia. By October 2003, Membership had risen to 219 and deliberate measures continued to be taken to transform ASSAf by increasing the membership of women and black people.

ASSAf relocated to the Didacta Building in central Pretoria where it shared offices with the South African Agency for Science and Technology Advancement (SAASTA), NACI and the Council for Higher Education.

Throughout this period the Academy continued to nurture its relationship with DACST and subsequently DST. A strong relationship with the ministry of science and technology is crucial to the success of any national academy of science, and even more so when the academy is young and still finding its feet.

US NAS gives sound advice

The United States National Academies of Sciences, Engineering, and Medicine serve (collectively) as the scientific national academy for the country. The US National Academies as they are known, or US NAS, are private, non-profit institutions that, like academies around the globe, provide expert advice on some of the most pressing challenges facing the nation and the world.

When the idea of a unified academy of science for South Africa was first mooted, the founders of what later became ASSAf were consulting widely to ensure a variety of perspectives were taken into consideration. During these early consultations they visited the US NAS. Dr Reinhard Arndt recalls how the American academies were tremendously sup-

portive of what the South Africans were trying to achieve. He says the Americans openly indicated the nature of the problems faced within their own academies. One of these was having three distinct bodies, which means they do not always speak with one voice. However, the strength of the US Academies is that they can use the power of the president's pulpit, as they have a presence in the White House.

The founders of ASSAf took this advice to heart and when launching the Academy in South Africa ensured that the body would 'empower' the South African government when making a decision by being able to say, "we have come to this conclusion based on the advice of the Academy". "The president of the country needs to seek out the advice of its academy. The leader of the country must know about the Academy and seek its advice", adds Arndt. "The head of the Academy and the President of the country should meet on a quarterly basis to discuss what's going on in the world, and to discuss the big issues of the day in innovation and technology."

The US NAS provided ongoing support through a mutually beneficial collaboration as ASSAf set up the machinery of a science academy. This provided the means for ASSAf to achieve its goal of becoming the preferred source of evidence-based advice for addressing issues of national concern in a shorter space of time than would otherwise have been the case.

A decade or so later, the US NAS made an even stronger commitment to support ASSAf, including a substantial annual grant. The full story of what became known as the African Science Academy Development Initiative, or ASADI, is covered in Chapter 6.

The money from the Americans encouraged the South African government to increase its annual grant-in-aid. These developments allowed ASSAf in ensuing years to increase staff, accelerate activities, adopt guidelines and regulations and generate a strategic plan.

Staff numbers at ASSAf grew from five at the start of ASADI in 2004 to 35 (including part-time staff and interns) by 2015. The increase in staff numbers was reinforced with formal personnel retention strategies and enhanced training systems.

During 2004 the Academy made a significant contribution to the debate on human resource development for science and technology with the publication of its report *Promoting South African S&T Capacities for the 21st century: From policy to reality*. The report was published in parallel with an international study by the InterAcademy Council (IAC) on S&T capabilities. Both reports were handed to the Minister of Science and Technology and senior decision-makers at a consultative workshop.

When Prof Wieland Gevers retired from his position at UCT and his term as President of ASSAf came to an end, almost simultaneously ASSAf was selected to be one of the participants in the US NAS initiative to develop African academies. That gave ASSAf sufficient funding to establish a secretariat on a firm footing and in January 2005 and Gevers assumed the role of part-time Executive Officer, an honorary position that was initially unpaid but later given an honorarium.

> *ASSAf now had two funding streams and it became necessary to establish the secretariat on a firm footing and essentially the person who single-handedly did that was Wieland. He hired people and he put systems in place, enabling the Academy to do what it needed to do from an administrative point of view." – ASSAf Founder Member Prof Robin Crewe, 2015*

Many academies were, and some still are, purely honorific, but when ASSAf was started, it was established as more than just an honorific academy. It was recognised that the Academy had to play an important advisory role on matters of national interest as well.

> *The original group that conceptualised the Academy was clear on the two roles that a modern academy would have to fulfil. Now you can be clear about the idea, but actually putting it into practice when you've never done it before is actually quite a tall order. In that respect Wieland interacted very strongly with the US National Academies of Science. The National Academies provided training to the individuals in the secretariat about the nature of the way in which advice was handled." – ASSAf Founder Member Prof Robin Crewe, 2015*

ASSAf-initiated studies started to take shape at this time. An Academy-initiated forum on subsistence agriculture in 2003 to this day remains a benchmark for high-impact studies. Others followed.

Professionalising the secretariat

This was a period in which ASSAf's *modus operandi* in terms of reports and advice was developed and the whole secretarial function was developed. The late Dr Barney Cohen of the US NAS was assigned to ASSAf and was a very effective mentor and good friend of the Academy staff.

The US NAS were very strong on teaching the academies that they interacted with about appropriate financial planning and accounting, because the accounting they required for the funding they provided had to be very precise. In addition, they were very emphatic that the academy should raise money to support its activities. So when they were asked to do a report, they would present a bill and say this is what it's going to cost you. These were very good conceptual things that were embedded in ASSAf early on.

> *When Wieland came on board as the Executive Officer, the Academy essentially took the decision that it had to have a professional secretariat and the secretariat had to be headed by someone with significant standing in the scientific community to make the work that they do credible. Wieland was the ideal candidate for the job, and he was passionate about establishing the Academy and ensuring that it operated effectively." – ASSAf Founder Member Prof Robin Crewe, 2015*

The Academy was called on to appear before the Parliamentary Portfolio Committee to explain itself, to describe what it was doing and make itself visible to Parliamentarians and policymakers and also establish a relationship with the DST. It was important for the Academy to carve out its niche in relation to the other science councils as well.

It's often difficult for people external to the science system to fully appreciate the two things that it does, namely recognising excellence and offering advice on issues of national concern. It was established very early on that the advice had to be independent. If asked for advice, the Academy was going to give the advice and publish it for public consumption. This has resulted in some tension at times.

In April 2004, Mosibudi Mangena took over the ropes as Minister of Science and Technology from Dr Ben Ngubane. Mangena was a wonderful Minister to have because he took an active interest in ASSAf. He really got involved, even reading the Academy's science magazines on the aircraft while travelling between ministerial engagements. (Gevers, 2015)

In October 2004, DST Director-General Dr Rob Adam presented the second set of Science-for-Society Gold Medals to Prof Hoosen Coovadia and Prof Brian Warner. Coovadia was cited for his leading role as a paediatric immunologist and world authority on paediatric HIV/AIDS. Warner was cited for his distinguished career in astronomy.

As required by the Act, Prof Jennifer Thomson was appointed to the Council by the Minister of Science and Technology as the representative from NACI.

One of the highlights in 2005 was the launch of the Academy's resource centre. The initiation of its partnership with the US National Academies enabled ASSAf to employ project officers and to handle projects making many demands for background analysis and information gathering. A need arose for a resource centre containing resource books, current annual reports of South African agencies in the science domain and other reference materials.

> *Innovation is not only about creating new products and systems, but rather about putting together existing ones in new ways to create wealth. The Academy is key to idea generation and the support of business (through funding and implementation), government (through policy and funding) and civil society (through adoption) is key to realising innovation." – ASSAf Chief Operations Officer Dr Xola Mati, 2015*

With the end-of-contract departure of the Academy's Administrator Dr Hennie Smith in November 2005, ASSAf reorganised its financial system by contracting its part-time accountant, Morakeng Malatji, to assume wider responsibilities and accept the new designation of ASSAf's (part-time) Finance Officer. Under supervision of the President and the Executive Officer, Malatji would oversee all reporting required in respect of the Academy's various funders.

The finance management process turned out to be one of the core elements in the growth and development of the Academy, and established a basis on which ASSAf set out to achieve financial independence and sustainability.

Chapter 6: Strengthening African Science Academies and Entering the Global Arena

ASSAf became a Founding Member of the Network of African Science Academies (NASAC), established on 13 December 2001 in Nairobi, Kenya, under the auspices of the African Academy of Sciences (AAS) and the InterAcademy Panel (IAP).

The intention of the nine founding academies was to work together for joint enterprises and projects, sharing of information and facilitating the development of science academies in other countries on the continent.

A brief history of a continent-wide academy of sciences for Africa

The AAS came into being in 1985. It is a pan-African individual membership academy with a mandate to recognise scientific excellence, perform think-tank functions and to implement major science, technology and innovation programmes. Current membership comprises about 300 Fellows extending over 41 countries.

Strategic partnerships are in place with the African Union (AU), the Pan-African University (PAU) and the New Partnership for Africa's Development (NEPAD). The Academy is financially stable and owns the property in Nairobi where its headquarters are based. Strong leadership and compliance with best international corporate management practices contribute to the Academy's efficiency.

During the early 2000s AAS launched NASAC and started working with the national academies.

As one of the nine academies of science in Africa at the time, ASSAf became a founding member of NASAC, looking forward to the prospect of working together on joint projects, sharing information and facilitating the development of science academies in other countries on the continent.

US National Academies approach the Gates Foundation for funding

In 2003, US NAS approached the Bill & Melinda Gates Foundation for funding to help promote African academies of science.

Because science academies operate as independent organisations, they are not linked to particular government programme offices or vested in existing government policies or specific political directions. Instead, they can serve a nation as a truly independent source of policy advice based on sound scientific criteria. In Africa, where much of the advice provided to governments often comes from external donors and lenders – who may have limited knowledge and experience of local conditions – the value of science academies to provide 'home-grown' advice cannot be overstated. Major new initiatives, for example, may be significant departures from historical practices and programmes, and national governments can look to their science academies to help develop new directions and initiatives.

ASADI is born

In 2004, the Bill & Melinda Gates Foundation awarded US$20 million to the US NAS for the African Science Academy Development Initiative (ASADI). The money (plus additional sums from other donors) was used to support the initiative in its aim to turn national academies into sustainable, effective sources of evidence-based advice.

ASADI came at a critical time for ASSAf. With a short history, having been established as a voluntary association in 1996 and given statutory recognition by the South African Parliament as late as 2001, the Academy has had to establish its credentials and spread its wings in a crowded system. Ghana's Academy of Arts and Sciences, the oldest unified national academy on the continent, was founded in 1959, the Nigerian Academy of Science was inaugurated in 1977 and the Kenya National Academy of Sciences was founded in 1983. Compared to these academies, ASSAf was the new kid on the block! In addition, what applied to South Africa, applied equally to the continental science scene, with the recent establishment of NASAC representing one of the first signs that the 'academy idea' might also have a role to play in the development of Africa.

> *"The key thing about the ASADI programme was to get a very clear insight into the methodologies that the US NAS used in order to generate their advice in various ways i.e. through consensus studies and fora and various other things of that kind. It gave ASSAf a template from which to work." – ASSAf Founder Member Prof Robin Crewe, 2015*

ASSAf is selected as one of the intense developmental partners

The US NAS, for some time, had been keen to link up with ASSAf and explore joint activities. Prof Wieland Gevers, former President of ASSAf, was in correspondence with the National Academies President Dr Bruce Alberts. Alberts was also a friend of ASSAf Founder Member Dr Mamphela Ramphele while at the World Bank. Dr John Boright, Executive Director of the international affairs office at the US NAS was present at the May 2002 meeting of African academies in Trieste, Italy, which was attended by former DACST Minister Dr Ben Ngubane. Boright also attended a NEPAD workshop on science and technology for sustainable development in Johannesburg during February 2003 and met at that time with Gevers and Parker in Cape Town.

During these meetings an important initiative of the US NAS was discussed as an offer to NASAC to build capacity in science academies in Africa through the training of staff in running academy projects, assisting in writing and producing authoritative reports and running intellect-focused organisations.

It was fortunate for ASSAf that the ASADI delegation that visited seven of the existing African science academies found in South Africa an impressive receptiveness, on the part of the principal government departments and agencies that were visited, of the notion that ASSAf might become useful to them as an independent, authoritative source of evidence-based advice on key problems for which they needed policy-driven solutions.

Gevers recalls as one of the highlights of his involvement with ASSAf as being the day when the delegation from the US NAS and the Bill & Melinda Gates Foundation announced that they had selected ASSAf as one of the developmental partners in the programme.

> *We sat in the boardroom of the DST and as the host, the then DG Dr Rob Adam was chairing the meeting. I made the case that ASSAf had gotten off to a good start and was poised to benefit from the American funding. But I feared that Dr Adam would throw cold water on it by saying that this is not something the South African government would support. I realised our government may not want to have the US telling ASSAf what to do." – ASSAf Founder Member Prof Wieland Gevers, July 2015*

Gevers adds that Adam was not at that stage unambiguously in support of the proposal. "I sat there on tenterhooks."

> *Then when Dr Adam finally said 'this is something that we definitely will support and we not only welcome it, but we will match what you do', I just couldn't believe it. I suddenly realised the Academy was being taken seriously by external bodies and they realised it had the potential to be drawn into the rest of Africa, linking up with other science academies." – ASSAf Founder Member Prof Wieland Gevers, July 2015*

Once Adam confirmed that the South African government would support it, the US delegation immediately awarded the grant to ASSAf. This despite the fact that the Academy had only one full-time employee, one part-time employee and Gevers as an unpaid agent. Immediately after the first grant came through ASSAf appointed three project officers and the ball began to roll.

The government's commitment, together with the commitment of the Academy Council to a national role for the Academy that would transcend the purely honorific focus of traditional academies, led to ASSAf being chosen as one of the US NAS' three 'intense partners' in ASADI, with funding of US$ 1.5 million over five to seven years within a framework of annual reporting and review. (This eventually stretched to a decade and ran from 2004 with funding ending in 2014.) The South African project was also embedded in the larger design of a collaborative developmental project for all of the seven participating African national science academies. A memorandum of understanding (MoU) – complete excepting for an ASSAf Strategic Plan to be generated and approved after the first year of the partnership – was agreed upon and signed by both partners, together with a formal contract.

The inclusion of ASSAf in the funded capacity-building project of the US NAS, together with Nigeria and Uganda, was a powerful shot in the arm and greatly enhanced ASSAf's planning and implementation strengths, while improving its international networking and connectedness. Collaborative partnering with these academies helped develop infrastructure, personnel, relationships between the Academy and its government, and rigorous procedures for providing policy advice. The grant also provided modest support to the academies of Ghana, Cameroon, Senegal, Kenya, and the regional AAS for strategic planning efforts.

> *Regrettably, some countries currently lack the resources and organisational systems to learn from policy successes and failures – and to generate new knowledge that would benefit their own societies and the world. The goal of integrating scientific advice and public policy can best be accomplished by boosting both the capacity and the credibility of the institutions that represent the scientific and medical communities in individual countries." – President of the US NAS Dr Bruce Alberts, April 2004*

The ASSAf strategic plan was submitted to the US NAS programme officers and the ASADI board, before being printed for extensive distribution inside and outside the Academy, and included in the MoU signed with the US NAS in July 2005.

The task of building ASSAf's capacity to serve South Africa in ways that resemble those in which, for example, the US is served by the US NAS, amounted to taking forward an organisation that in the first ten years of its existence had produced only one national advisory report, was largely unknown or unrecognised in the ranks of government officials dealing with policy issues, and had been pre-occupied with establishing itself in a highly problematic historical setting.

African nations would benefit from stronger, more influential science academies, whose expertise could be brought to bear on the continent's pressing issues. The focus of the programme was to help the continent face challenges related to the HIV/AIDS epidemic, chronic malnutrition, and life-threatening childhood conditions, including malaria and diarrheal diseases and helping scientists and health care professionals contribute to policy decisions to tackle these issues. Some of the funds would be used to train staff members of the selected African academies to plan and conduct scientific studies and hold major conferences that offer policy guidance; raise and manage money from outside sources; tap useful information technology; and cultivate relationships with government officials and other stakeholders in their respective countries.

The ultimate goal of this initiative was to help each participating academy achieve, by the end of the ten-year period, a well-developed and enduring capacity to provide credible policy advice for its nation.

One of the objectives of ASADI was the training of African academy members and staff members to conduct policy advisory studies and to manage finances. Training often took place at the US National Academies offices in the US as well as via Skype or teleconference and at learning collaboratives. Staff members of ASSAf would in turn train colleagues. This secretariat-strengthening activity was deemed the most successful part of ASADI.

Regional conferences to strengthen relationships

Complementary to the efforts to build capacity at the national level, a regional conference held annually over the ten-year life of the project was intended to enhance cooperation among African science academies, strengthen relationships among representatives of the academies and the policymaking community, and foster a greater understanding and appreciation of the value of evidence-based policy advice.

The first annual collaborative workshop and conference of ASADI was held in Nairobi, Kenya in November 2005.

> *Due to its history, South Africa was completely at odds with the rest of Africa. It had a 'Limpopo curtain' that separated it from the rest of the continent. ASSAf is proud to have been one of the organisations that very successfully breached that divide by reaching out to the rest of the continent. ASADI was the start of that process." – ASSAf Founder Member Prof Wieland Gevers, July 2015*

In addition to annual conferences, annual joint learning sessions created a support network of African and US science academy staff involved in policy-advisory activities. These meetings focused on collaborative problem solving, the exchange of best practices and strategies for project implementation and practical training.

The programme was carried out using a phased approach. Early activities included training for academy staff, establishing contacts with appropriate government agencies and other organisations, fundraising, and implementing a variety of convening and consensus-based activities on subjects selected by the African academy in consultation with its government, with staff members from the US NAS serving as external consultants. Over the course of the initiative, partner academies conducted activities increasingly independently and were responsible for securing matched funds so that the programmes could be sustained after the grant period had ended.

Partner African science academies also assembled an international database of African scientists with technical support from the US NAS. The most recent version of the database includes the expertise, contact information, and current affiliation of over 750 leading African scientists on the continent and in the African diaspora. When shared across countries, the database will help science academies easily identify and recruit experts for policy-advisory activities.

The next stage of the ASADI process will seek to address funding issues for national academies. In particular government funding remains a tricky issue. The money governments pay to a science academy may not necessarily buy the advice they want to hear. Called Africa's Science Academy Development Agenda (ASADA), the new initiative would be led from within Africa by the NASAC made up of all 27 academies on the continent, including ASSAf.

The aim is to build the network and national academies as sources of advice on a continental scale, to inform policy-relevant bodies such as the AU. This ambitious new development would continue to support ASADI's original worthwhile intention: to enhance the link between evidence and policy in Africa in ways that directly improve people's lives. Prof Iqbal Parker recalls how, when the ASADI programme was announced, he was a member of the South African delegation that accompanied the American delegation around the country and introduced them to the science councils, DST, various research institutes in South Africa and other relevant bodies.

> *A lot of the South Africans were quite sceptical about the intention of the US with the ASADI programme at the time, thinking they were wanting to dominate the process and establish their footprint. However, once NASAC was launched they stepped back and allowed the network to take off on its own." – ASSAf Founder Member Prof Iqbal Parker, 2015*

ASADI proved to be an initiative of good intention. Once it had run its course NASAC took off and the general meetings ensure continuity of the network.

Giving advice is always specific to a context. Therefore giving advice in the US is quite different from the context in which advice is given in South Africa or Zambia. Although the US advice, funding and input was catalytic in actually giving ASSAf a clear idea of how they could operate, one of the key things the various committees that produced reports recognised was that they had to adapt the procedures to the way in which South Africa operates. That adaptation was very useful. And part of that adaptation itself was having the Academy implement some of the recommendations from those reports.

For instance, the whole scholarly publishing programme within the Academy arose out of that first report.

In the US, the National Academies would present the report and then there would be a myriad of agencies that would deal with the recommendations and the National Academies would move onto something else.

> *In South Africa, the Academy would make the recommendations, but if it wanted them to be implemented as well, then the Academy itself would have to be involved in the implementation. That's a very significant difference in the way that many other academies operate." – ASSAf Founder Member Prof Robin Crewe, 2015*

There was a very good dialogue between Gevers and ASSAf and the people at the US National Academies, because they recognised that what he and ASSAf were doing was actually taking the advice that they had given and moulding and adapting it to the local conditions in a way that would have significant impact.

ASADI's experience is instructive for others who might follow a similar path. There are compelling reasons to do so. For one, southern nations lack a dense web of policy institutions so their need for research-based policy evidence is especially acute.

ASADI is reviewed and declared a success, ASADA takes over the reins

In October 2013, the US NAS requested the IAC, a group of science, medical and other scholarly academies that provide scientific advice to international bodies, to do an independent, summative evaluation of ASADI. In its final report, delivered in 2015, the reviewers found that the initiative had succeeded in its overall aim of improving capacity for evidence-based policy. The reviewers concluded that although their influence has grown, staffing and resource problems are still common among African academies.

Chair of the IAC review panel, Prof Turner Isoun said the five academies that received the bulk of support – in Cameroon, Ethiopia, Nigeria, South Africa and Uganda – had used ASADI to strengthen their own internal organisation, for example by hiring qualified managers and finance experts. But they had also increased their ability to influence the policy process. The review counted at least 29 such interventions – mainly consensus reports offering evidence on specific issues, commonly in health and sustainable development.

ASSAf was lauded for establishing a secretariat and for growing its Membership base, as well as for the tremendous progress made in a short period of time. Looking to the future, the review panel identified some of the challenges facing ASSAf, including meeting the expectation of stakeholders as the demand for advice increases – especially from government, diversifying its Membership base, sustaining the volunteer service of its Membership to ASSAf activities, and maintaining a professional staffing base to meet the increasing demands for academy advice.

ASADA – led from within Africa by NASAC and made up of all 27 academies on the continent – will seek to build the network and national academies as sources of advice on a continental scale, to inform policy-relevant bodies such as the African Union.

"This is ambitious", adds Isoun, who is also a former science and technology minister of Nigeria, "but I believe it continues to support ASADI's original worthwhile intention: to enhance the link between evidence and policy in Africa in ways that directly improve people's lives." (Isoun, 2015)

A Network of African Science Academies is realised

NASAC was established on 13 December 2001 in Nairobi, Kenya, under the auspices of the AAS and the IAP. It was committed to enhancing the capacity of existing science academies and encouraging the creation of new academies in countries in Africa.

At the inception meeting the NASAC statutes were drafted and signed by the nine founding member academies including ASSAf. The AAS, having initiated the process of forming the Network, agreed to host its secretariat in Nairobi, Kenya. In 2015, NASAC membership stood at 21 member academies. (NASAC, 2015)

ASSAf became very active in the African network and in 2004, Prof Wieland Gevers – as President of the South African body – attended the general meeting of NASAC in Abuja, Nigeria where ASSAf was elected Vice-President of NASAC.

Prof Robin Crewe – ASSAf President from 2005 to 2012 – has been involved in NASAC since the early days of its establishment. In 2010, he was elected NASAC President during the 6th General Assembly of the network, held in Cape Town, South Africa. He says ASADI dovetailed well with NASAC to contribute to the development of capacity among member academies of the network.

> *"The ASADI programme allowed NASAC to piggyback on their initiative in order to get all of the academies together. The US National Academies initiative started getting a number of African academies to start working together. And although initially three African academies of science were selected to be part of the formal programme, a larger number of African academies were always invited to attend the meetings." – ASSAf Founder Member Prof Robin Crewe, September 2015*

NASAC would be a permanent fixture unlike ASADI which was simply a project to get things going. The three selected ASADI academies would be used as a springboard

to develop the rest of the academies on the continent and help launch new national academies where none existed.

> *I felt that NASAC should be very strongly built and ASSAf played a driving role in the regard. There have been a few speed bumps along the way, but that's inevitable in the development of an organisation. The number of African academies from the initial group has increased from nine to 22 or 23 in 2015 – some of them new academies. For example, ASSAf has been involved in trying to assist with the establishment or support of the academies in southern Africa." – ASSAf Founder Member Prof Robin Crewe, 2015*

In the same way that national academies of science provide science-based advice to national governments, international associations of academies can provide international authorities with advice on matters of global importance. This role is actively pursued by the IAP. On the African continent NASAC was poised to play this role, and would link up with the NEPAD, an African Union strategic framework for pan-African socio-economic development.

Parker says he believes NASAC was fairly successful in that, "It brought Africa's academies together and under the umbrella of NASAC a number of initiatives have been successfully completed and implemented, including the report on the impact of climate change on food security in Africa, another on building science, technology and innovation capacities in Africa".

In the review report of ASADI, conducted on behalf of the IAC, authors Prof Robbert Dijkgraaf and Prof Daya Reddy summarised that a specific priority for NASAC might be to act as connective tissue for the academies, strengthening their reach and influence. (Reddy, 2015)

Early signs of international cooperation

Because knowledge is universal, an academy is inherently an international organisation. ASSAf recognised that it had to be part of the international family of academies. There was a major effort to participate in external academy activities.

The efforts were spearheaded initially by Gevers and Prof George Ellis in relation to the IAP and the IAC, because those were the two major umbrella bodies. ASSAf was also involved in the premier international science academy of developing countries, the Third World Academy of Sciences (TWAS) as it was known at the time. Professors Ahmed Azad, Daya Reddy, Wieland Gevers and Valerie Mizrahi were among the first ASSAf Members to become TWAS Fellows.

There were increasing numbers of bilateral visits by South Africa to other countries around the world to discuss scientific cooperation. Chapter 11 looks at ASSAf's evolving and expanding international role.

Chapter 7: A Seismic Shift in the Academy's Role and Impact

ASSAf spent its early years creating itself as a new institution to replace the racially and linguistically divided organisations that existed during the apartheid era that ended in 1994. A lot of time and effort went into addressing governance issues, building the infrastructure and positioning of the Academy in relation to government. This was a mammoth task. Academies of science have been known to take centuries to properly coalesce. Launched in 1996, ASSAf did not have the luxury of time on its hands and had to move fast to establish itself and start making valuable contributions to various discourses in order to ensure continued funding and support.

During the first decade of its existence, ASSAf established itself as an inclusive, merit-based body that fitted contextually into South Africa's young democracy. A number of historical factors made its path less than smooth, but international recognition in an evolving new world science academy system and increasing internal recognition and support by government, civil society and academia gave momentum to its upward trajectory.

> *"There are periods in the life of institutions such as the Academy during which much of the preparatory work of the past leads to a seismic shift in its role and impact. The past year has seen such developments for our Academy based largely on the establishment and consolidation of a well-functioning secretariat that is admirably led by our Executive Officer, Prof Wieland Gevers and the team that has been assembled to support our burgeoning activities." – Message from the President Prof Robin Crewe, ASSAf Annual Report 2005 – 2006*

The increase in funding and consolidation of a professional secretariat meant that ASSAf could really get to work. International activities expanded dramatically, linked to internal growth and the development of the Academy's capacity to function as South Africa's national science academy in the fullest sense.

The key activity by which the Academy would proceed to carve out its national reputation would be the production of authoritative, high-quality reports on key science-based issues affecting the nation's future. The ASSAf Council remained mindful that the focus of the Academy's work should be on the scientific analysis of already available, enquiry-generated evidence that can help policy development in South Africa, rather than on prospective research. This distinguishes its niche from that of the science councils, such as the CSIR and the HSRC.

An engine of excellence in scholarship and intellectual cooperation

The Academy had developed solid policies and guidelines for its activities as they became necessary.

The initiation of the ASADI partnership with the US National Academies prompted the generation, proposal and adoption of guidelines for proposals of science-based topics in terms of the ASSAf Act, of guidelines for proposals of science-based topics (project proposals), of guidelines for the appointment of study panels and forum steering commit-

tees, a policy on support for conferences, the formation of a Committee on Science for the Alleviation of Poverty, and a brief for the consensus study on Nutritional Influences on Human Immunity.

The international activities of the Academy had expanded considerably, not only as a result of the engagement with the ASADI partnership, but also because the Academy's increasing involvement in developing bilateral and multilateral relationships with other academies.

Clarifying the niche of the Academy

National science academies are assuming increasing importance in the world science system, both as unique and potentially valuable entities in their respective national systems of innovation and science-based development generally, and in regional or other supra-national configurations, up to the global body called the IAP, with its dedicated subsidiary unit the IAC, generating evidence-based reports and recommendations for the global community of nations.

Many national science academies are also the adhering bodies of the International Council on Science (ICSU), promoting individual disciplines worldwide, and organising international cooperation in large-scale, global projects.

Like democratic South Africa in general, ASSAf aspires to play both a national and an international role, particularly with respect to the African continent. It is useful **at arm's length** from government and other organised sections of the state, comprising an assembly of excellent scholars from many disciplines who are well-networked both nationally and internationally, and have shown their interest in and capacity for promoting the development of a prosperous and a fully enabled society.

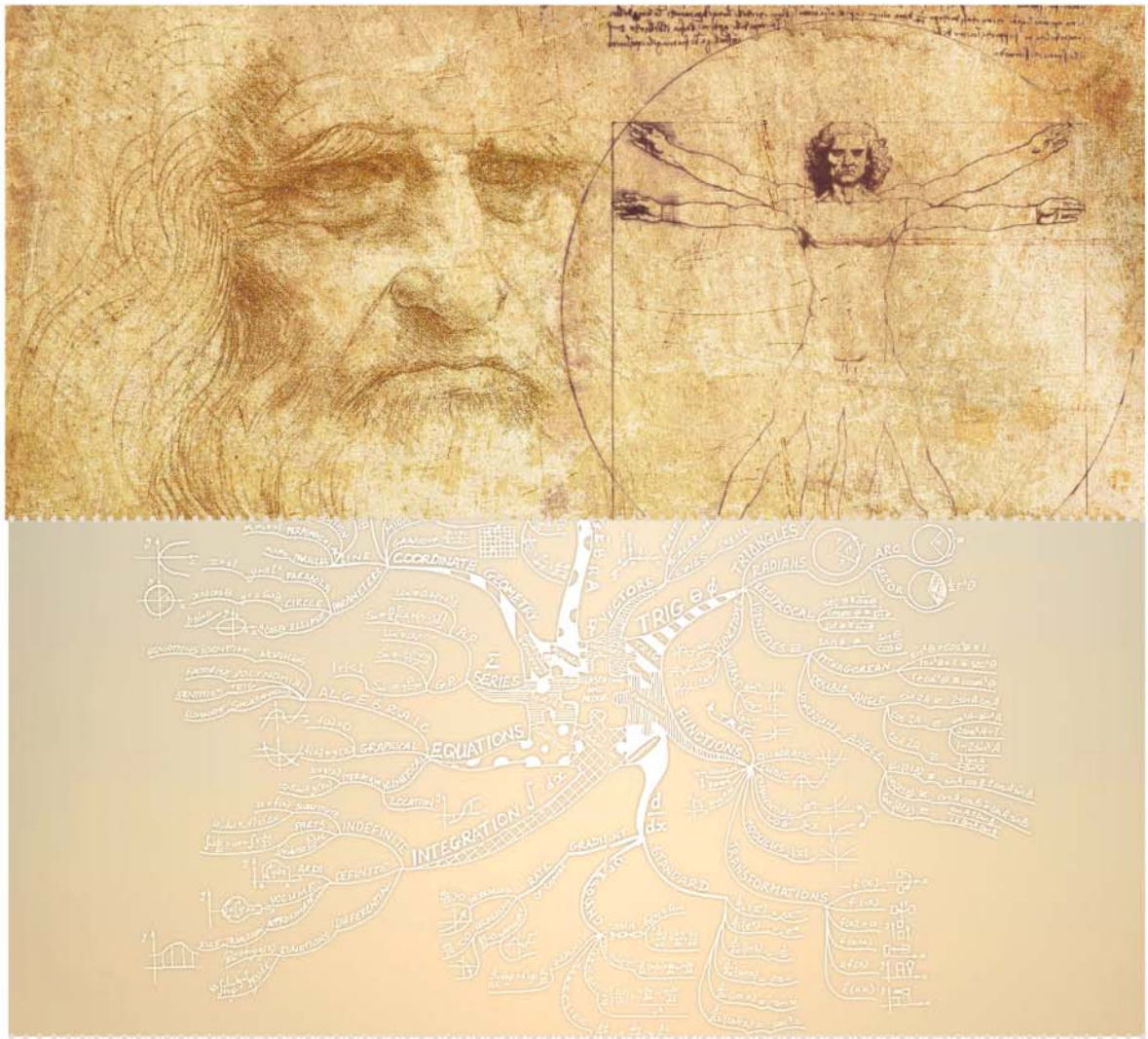
Membership of the Academy (by election) is both an honour and an obligation to work individually and collectively (as the Academy) to ensure that decision-making requiring scholarly scrutiny and analysis is based on the best and most integrated understandings and insights available to the country. The academicians thus represent an organised, independent but responsive scholarly voice to help guide the development of the country and its people.

At the end of the first decade ASSAf identified its priorities as being to:

- become increasingly associated in the mind of the nation with the highest levels of scholarly achievement and excellence in the application of scientific thinking for the benefit of society;

- consolidate its infrastructure and capacity, and to expand and mobilise the Membership to ensure that scholars from a full disciplinary spectrum are available for its work, and that these are indeed both thinkers and doers, willing to put significant effort into the Academy's activities;
- embark on a programme of systematic studies of evidence-based issues of national importance, some proposed by government or other sectors, and some identified by the Academy itself;
- develop a sound and robust methodology for constituting study panels, organising their work, including conferences and workshops, and producing authoritative reports that are well disseminated and have significant impact; publish science-focused periodicals, especially a multidisciplinary journal of high quality (the *South African Journal of Science*) and a science magazine that will showcase the best of South African research to a wide national (and international) audience (*Quest – Science for South Africa*), and to promote the development in South Africa of an indigenous system of research journals of internationally recognised quality and usefulness;
- develop productive partnerships with other organisations, especially (but not only) the departments of science and technology, education, health and agriculture; the National Advisory Council on Innovation; science councils; higher education institutions, etc., with a view to the building of capacity in science and its applications within the NSI;
- create new and diversified sources of funding for the sustainable functioning of an independent Academy;
- communicate effectively with the general and specific publics, as well as with partners and sponsors;
- develop a plan for the expansion of the activities of ASSAf in partnership with the national science academies of other countries, including contracted partnership with the US National Academies; and
- play a significant role in the international science system, particularly in Africa, through organisations, such as the IAP and the IAC, TWAS, ICSU, as well as the NASAC, all in the context of the NEPAD.

Since the Academy Act, ASSAf had been required to present an annual performance plan in order to qualify for the grants-in-aid provided by DST. As the sun set on the first decade, ASSAf launched its first multi-year strategic plan for 2006 – 2009 to provide clear goals and objectives over the projected time-span of the ASADI project. Looking at strategic priorities the plan included enhancing public communication, building a resource base for sustainability, and finally providing measurement of success. ASSAf's future role would be reliant upon increased capacity and activity, as well as through partnerships. The involvement and contribution of its Members would determine the scope of its potential contribution. ASSAf started looking at providing mechanisms for evaluating and monitoring progress towards the desired vision.



Science is a beautiful Gift to humanity; we should not distort it

APJ Abdul Kalam

Part B: Delivering on its Mandate

Like universities, science academies have strong survival prospects in societies because they are in principle, and often in practice, a demonstrable 'public good'. Many would agree that South Africa's national science academy has achieved the status of a national asset, after only 20 years, despite having had to contend with many difficulties in its operating environment since its inception in 1996. (Gevers, 2016)

The Academy of Science of South Africa was, to an extent, a child of its time in the sense that it came into being when some of the most influential leaders of advanced country academies began to advocate a shift from the traditional inward-looking focus of such bodies towards the foregrounding of societal service in the form of consensus advice generated by a full review of available evidence across the disciplinary spectrum.

ASSAf was recognised as having pre-aligned itself with this shift, believing firmly that a national science academy in the modern era exists primarily to make possible the efficient and effective mobilisation of a nation's intellectual 'firepower' to address its most urgent problems.

It was consequently not a surprise that ASSAf was elected to membership of the first IAC when this body was formed in 2000 to drive the performance of international consensus studies on issues of global importance.

The Academy has continued as well fulfilling its honorific role, recognising and rewarding excellence and promoting innovation and scholarly activity, but it has also shifted up a gear and is increasingly fulfilling its roles of assisting with addressing issues of national concern, promoting effective, evidence-based scientific advice, as well as meeting its other overarching goals.

A milestone was reached in 2011, the first year that ASSAf began functioning independently of ASADI. This marked the beginning of a new phase in ASSAf's short history; a phase in which the Academy was poised to strengthen its science advisory activities and to spread the lessons gained from the ASADI programme within the broader African region.

International linkages continued to grow throughout.

The activities of the Academy were structured into five programmes as follows: Governance and Administration; Scholarly Publishing Programme; Policy Advisory Programme; Liaison; and Communication and Publications.

In order to have impact, an Academy must communicate about its activities and disseminate its work to stakeholders and society. The Communication and Publications division is responsible for the ASSAf brand; for periodicals and non-periodicals; newsletters; the stakeholder data base for the distribution of ASSAf publications; the ASSAf website and media monitoring to track media coverage of ASSAf activities. The unit also plays a science awareness role and manages events.

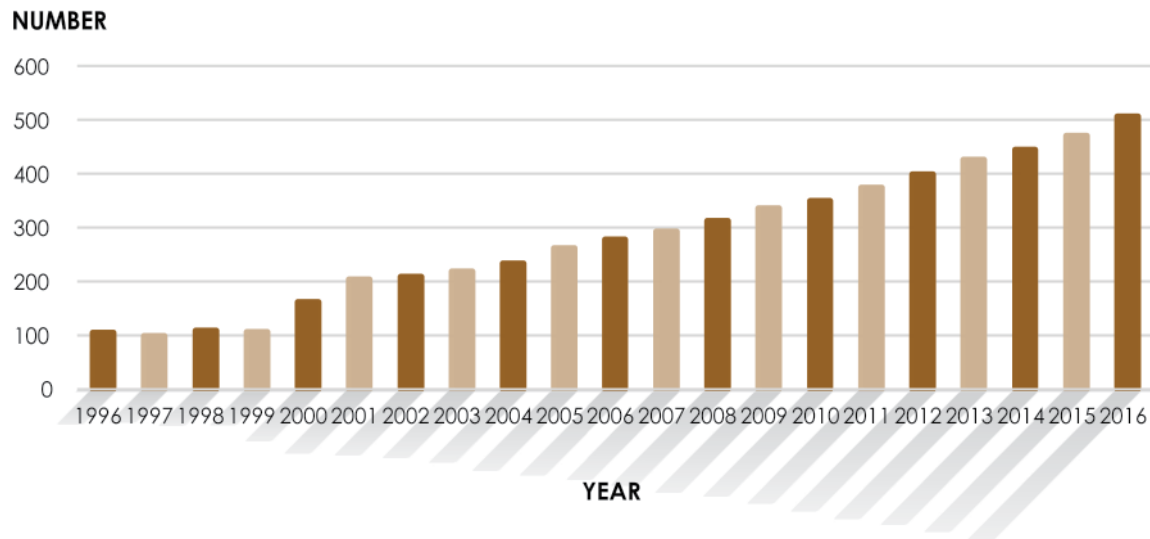
The second half of this book delves into the era when ASSAf unleashed its full intellectual potential and started delivering effectively on its mandate and assisting society at large.

Chapter 8: Unleashing ASSAf's Full Intellectual Capacity

ASSAf is constituted to ensure that leading scientists, acting in concert and across disciplines can promote the advancement of the application of science to the problems and challenges facing South Africa. Although it is 20 years since ASSAf was founded, it is in the second decade of its existence that the Academy started to deliver effectively on its mandate. It was during this period that – through its Membership, which represents the collective voice of the most active scholars in all fields of scholarly enquiry – ASSAf started to generate evidence-based solutions to help address national problems.

Academy Membership as of October 2016 comprised 506 Members. A total of 38 new Members was elected in 2016.

ASSAf Membership 1996 – 2016



The transformation imperative

ASSAf draws its Membership from all population groups and from all scientific disciplines. Although Academy Membership has increased over its two-decade existence, there is still underrepresentation of blacks, women and certain disciplines. Each year in its Membership call, ASSAf strives to reflect more accurately the changing profile of South African scholars.

The current gender and racial profile of ASSAf is 29% black and 25% female.

The challenge of changing its Membership profile, while simultaneously maintaining a merit-based science academy, is being addressed proactively through ASSAf's support of SAYAS and other initiatives. Chapter 12 is dedicated to SAYAS and describes in more detail the reasons for its establishment, which includes the potential contribution of a young academy to transformation.

Academies, by their very nature, comprise members who are advanced in years and who are elected members/fellows of an academy after a distinguished career and significant contributions. This basic tenet of academies is important to uphold, but it places a responsibility on existing Academy Members to foster the next generation of scholars.

As a result of South Africa's history and the unique process of its establishment in 1996, ASSAf's Founder Members were, largely, white men from the natural sciences. The founders worked hard to be as inclusive as possible, but among the 100 Founder Members elected in 1995, 29 were black, only a handful were women and only two, Prof Olive Shisana and Dr Mamphela Ramphele, were black women. A small number were from the human and social sciences.

> *ASSAf needs to ensure balance in Membership in terms of not only race and gender, but also in terms of institutional affiliation. A lot of our early Membership was drawn from the RSSAf and they came from mainstream English universities, as well as the Akademie whose members were drawn from mainstream Afrikaans universities. So if the nominations are by Members themselves, then they are replicating themselves and that has always been ASSAf's challenge. ASSAf has always recognised that challenge but has not been able to successfully change it… yet." – ASSAf Chief Operations Officer Dr Xola Mati, July 2015*

Geographic spread of Membership is not as wide and diverse as ASSAf would wish it to be. Due to the nature of the nomination process, Members tend to nominate people they've worked with, so often academics at regional universities lose out.

This chapter reflects some of the ongoing efforts to address these issues and transform ASSAf into an Academy that better reflects the society it serves.

Drawing in the humanities and social sciences

The needs of society are dominated by the natural sciences, technology and applied knowledge. The public value of the humanities and social sciences therefore continue to be debated. The humanities highlight the nature and the force of the narratives that help define how we understand our society. And yet they remain underrepresented in formal scientific bodies.

The number of humanities scholars who were elected as ASSAf Members was low at kick-off in 1996 and this situation did not change significantly during the first five years or so of the Academy's existence. However, the number of scientists from the humanities and social sciences received a minor boost after the creation of the NRF, when the concept of evaluating and rating individuals in all disciplines was endorsed.

> *The new NRF ratings system, launched in 2002, was such an equaliser, because suddenly scholars in all disciplines were being rated by the same system. This was an eye-opener for many." – ASSAf Founder Member Prof Wieland Gevers, July 2015*

The NRF rating system started levelling the playing field in some ways, because it meant social scientists could be A-rated scientists.

There were other activities that enhanced the status of the humanities.

The new editorial model for the *South African Journal of Science (SAJS)*, as introduced by ASSAf at the end of 2008, had a part-time Editor-in-Chief, supported by ten part-time Associate Editors in various disciplines. The focus of the *SAJS* was also deliberately broadened, specifically targeting the hitherto neglected humanities and social sciences. As a result, submissions in the fields of the humanities and social sciences steadily increased.

ASSAf's activities in the humanities domain were also highlighted by the ASSAf consensus study report on *The State of the Humanities* released in August 2011. The study used the contemporary South African deployment of the term 'humanities' to include the social sciences and performing arts, as well as law and education, which are intimately linked with the humanities.

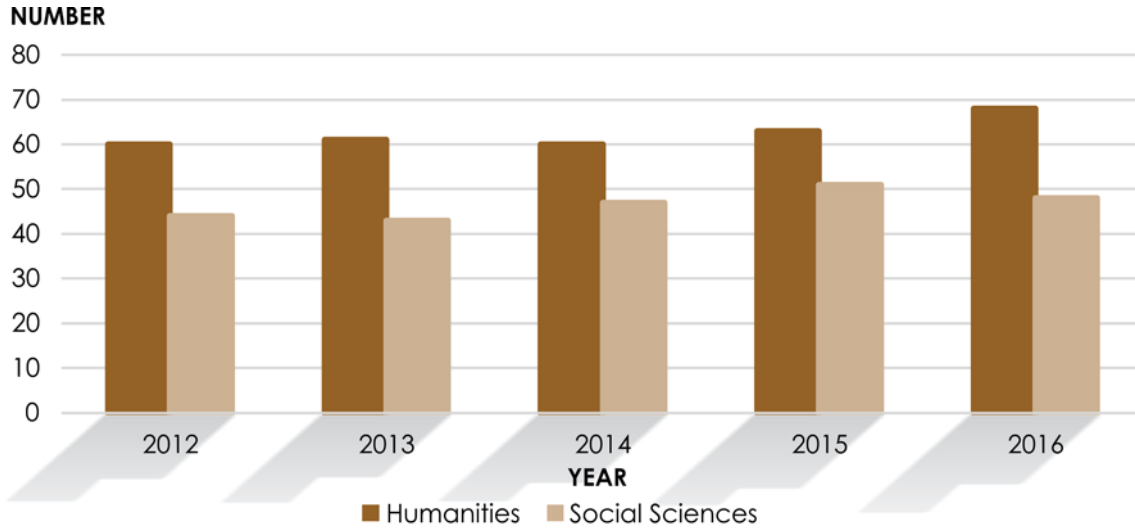
The consensus study on *The State of the Humanities* in South Africa, declared the humanities to be in a state of crisis, reflected in the alarming decline in student numbers, falling graduation rates, and decreasing government funding.

> *South African scholars witnessed a fall-off in support for the humanities post-1994. Although not unique to this country, the reason for the failing interest is easy to explain. Public discourse and government policy have turned away from supporting the humanities and towards science and technology. Indeed, the country's national research plan is based on the notion that innovation – driven by the so-called hard sciences – is good for economic growth. In this particular framing, the usefulness of the humanities and some of the social sciences have been found wanting." – ASSAf Member Prof Peter Vale, 2011*

One of the study's ten recommendations was that ASSAf redesign itself so that its commitment to the humanities becomes more evident. The Academy subsequently reassessed itself in order to give weight to all the disciplines.

As of October 2016, 66 of the 506 ASSAf Members are from the humanities and 52 from the social sciences. These numbers are significant and continue to grow steadily.

Humanities and Social Science Membership 2012 – 2016



As society approaches the third decade of the new millennium, there is an ever-increasing recognition of the critical role that the social sciences and humanities can play in achieving sustainable development. On a global scale, the social science and humanities are crucial to solving the problems of the world, from climate change to problems around social control. The debate about the inclusion of the social sciences and humanities in research is not new, but in South Africa in 2016, the issue becomes urgent when we consider the prevailing environment and the triple challenge of poverty, inequality and unemployment.

> *Social scientists should assist policymakers to take evidence from the sciences more seriously, and to apply knowledge to achieve greater equality. They should help develop policies to end injustice and discrimination and become activists for global equality." – ASSAf gold medallist Prof Olive Shisana (Shisana, 2015)*

Today ASSAf's activities in the humanities field are overseen by a standing committee, which was established in 2012 following one of the recommendations of *The State of Humanities* in South Africa study.

An international conference entitled On Being Controversial: The Humanities Reach Out was held in June 2014 in Pretoria, with Prof Craig Calhoun, Director of the London School of Economics and Political Science, as keynote speaker. The conference sought to unlock the questioning spirit of the humanities and, in doing so, showcased their range and relevance for contemporary South Africa. The immediate focus of the conference was South Africa in its twentieth year of democracy.

> *We social scientists must be actors for ending inequality. Addressing inequalities is not only good for the poor. It is good for all." – ASSAf gold medallist Prof Olive Shisana (Shisana, 2015)*

Nevertheless, the process of transforming these numbers is slow in any academy milieu. Even top scholars are known to be very insular and find it difficult to translate their own discipline into others. The natural scientists therefore tend to nominate candidates from the ranks of peers in their disciplines and in related disciplines. And, since only Members are nominators and voters, this historical bias in terms of discipline has continued over time. Despite ongoing efforts by ASSAf to encourage Members to nominate under-represented disciplines, the bias still dogs the Academy today.

> *The social sciences matter in every facet of human existence. Local social scientists have made important and deep contributions to issues such as identity, gender and indigenous knowledge. And there are many more fields in which they can be instrumental." – Minister of Science and Technology Naledi Pandor (Pandor, 2015)*

Looking ahead, ASSAf supports efforts to re-imagine the social sciences in South Africa, to revitalise thinking on twenty-first century South Africa by positioning the humanities, especially its critical spirit, at the very centre of the national conversation. The Academy is engaging with key stakeholders with a view to promoting the cause of the humanities and it is looking at initiating an annual ASSAf Humanities Scholarly Lecture.

Targeted drives to increase the pool of black and women candidates

The promotion of the diversification of Academy Membership is highlighted as a priority strategic objective in ASSAf's *Strategic Plan 2015 – 2019*. Transformation of Academy Membership is essential to ensure legitimacy, to enable full participation by all potential candidates and to avoid perpetuating past historical imbalances. The full diversity of South Africa's population is required to address the challenges of the nation.

In early 2016, the executive office-bearers of the Academy held a workshop to discuss what can be done beyond existing efforts to ensure transformation and to address specifically the issue of the relatively few black Members of ASSAf, particularly black African Members. Acknowledging that the pool is relatively small and this issue will be addressed over time, the executive team wanted to explore how to go beyond this particular limitation and fast-track transformation.

Considerable effort is expended during Member elections to increase the pool of nominations of women and black candidates. The challenge for ASSAf is that according to its statute, Members are elected by the full Membership of ASSAf. Hence, the final outcome is not under the control of the ASSAf Council or the secretariat.

> *The election process needs to be cleaned up. It might require the Act to be revised and that can be done in time, but in the interim we are exploring additional actions we can take at this stage to diversify Membership." – ASSAf President Prof Daya Reddy, March 2016*

The challenge of transformation is not unique to ASSAf – it is South Africa's challenge, a challenge for science as a whole and a challenge for all science institutions. Ultimately, in order to be effective and be recognised, Academy Membership must reflect the society it serves.

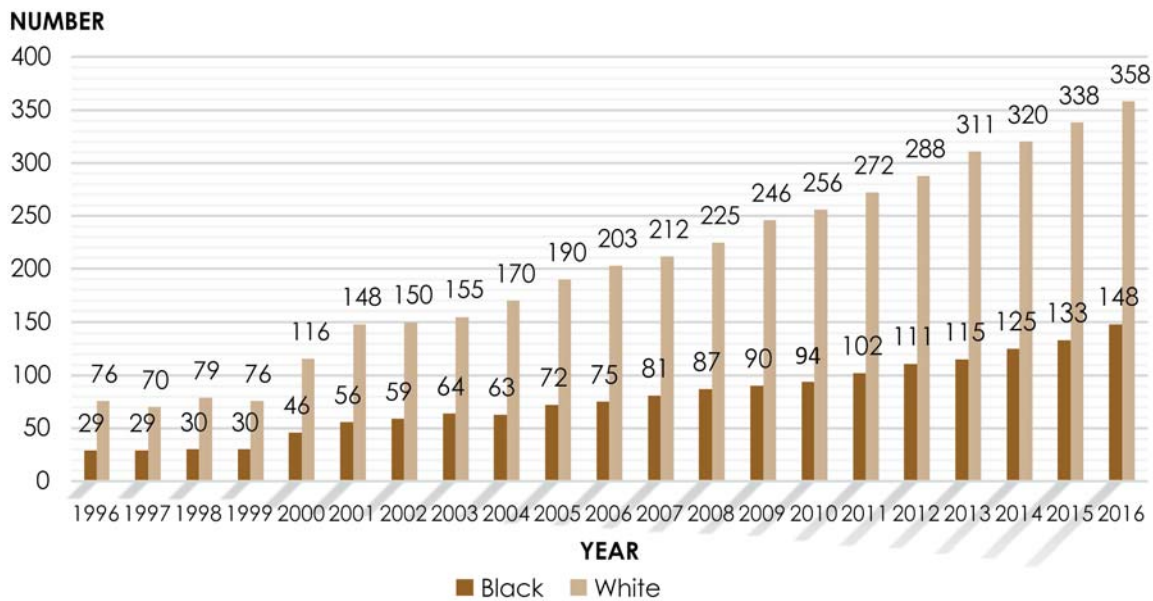
"The under-representation in the ASSAf Membership of black scientists (specifically black African scientists) and women remains an issue of concern and receives ongoing attention." – ASSAf Executive Officer Prof Roseanne Diab, January 2016

Beyond Membership, ASSAf also encourages better demographic representivity on Council, panels, standing committees and working groups.

Where are the black Members?

In 2016, black Membership of ASSAf stands at 29% (i.e. this includes black, coloured and Indian Members). The reasons for this low number are complex – partially historical, partially structural and partially linked to the specifics of an academy of science.

Membership by Race 1996 – 2016



Nelson Rolihlahla Mandela's own words on education and science are enlightening: "Education is the enemy of prejudice" and "Science has no room for racism". The struggle for political freedom prior to 1994 was closely associated with the desire to develop scientific and technological capacity.

During the years of apartheid – and before – educational opportunities for black South Africans were severely limited. With the exception of missionary schools (and the University of Fort Hare, which grew out of a mission school) and, later, ethnically based universities and the University of Natal Medical School, opportunities for education at all levels were limited to very small numbers for anyone who was not white.

The pool of potential black Members was already small when the Academy was launched in 1996. Added to that was the fact that the new government needed the greatest minds in the country to help build the new South Africa. This often took scholars away from academia in order to serve a national role.

Without doubt, the efforts of black intellectuals have contributed significantly to the post-democratic achievements of South Africa. But at what cost to themselves, and to their fields of knowledge? At the time when ASSAf was being formed in 1996, many leading black scholars and intellectuals were called to serve in national capacities to help the transition to democracy. Many continue to serve in government departments and other national agencies. This meant that some had to choose between national service and scholarship. Others who are in academia have dedicated themselves to playing a national role in research capacity building among young black scholars by being mentors.

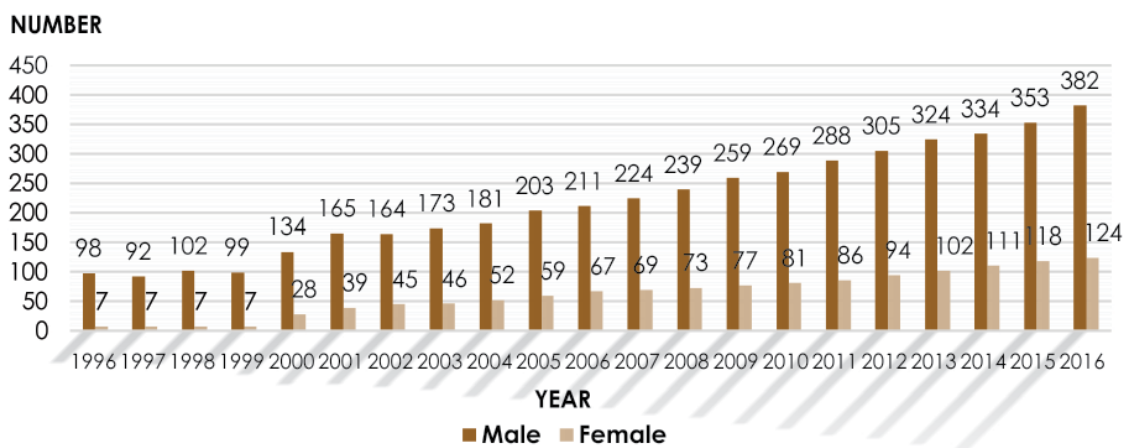
Addressing equity and transformation requires a multi-pronged approach. Interventions have to be consistently and strategically driven. Transformation has to be addressed from the foundations of education (at school level) all the way through to postdoctoral level. It is a national effort that involves all players in the science and education ecosystem.

A universal shortfall of women members

An IAP/ASSAf report on women in science academies, released in February 2016 reveals a universal shortfall of women members in science academies around the globe.

The IAP study, published by ASSAf, is the first to present a comprehensive picture of women's representation in science academies worldwide. The study, *Women for Science: Inclusion and Participation in Academies of Science*, surveyed 69 member academies of the IAP. It found that women are only 12% of academy members on average, and in nearly half of the academies, fewer than 10%. ASSAf's 24% makes it one of the most women-friendly academies in the world, but at 4% women, Tanzania's Academy of Sciences shares the last place globally with Poland.

Membership by Gender 1996 – 2016



The report recommends ways academies should promote greater gender parity among members. These include collecting annual data on women membership and establishing permanent structures to promote the role of women – not just within the academy but also more broadly across science, technology and innovation.

> *"The problem is not that there aren't enough women scientists. Across the world, the proportion of women in science generally is vastly bigger than the proportion of women in the academies." – Linda Nordling, Science Journalist, Research Africa*

Although South Africa has many favourable policies aimed at promoting the participation of female scientists, women remain largely underrepresented in many scientific fields. ASSAf is committed to promoting women in science activities and highlighting the importance of applying a gender lens in activities that it undertakes.

ASSAf's efforts to address the gender imbalance are enhanced by its hosting of the South African National Chapter of the Organisation for Women in Science for the Developing World (OWSD). Inaugurated in 2009, OWSD SA was constituted by a group of OWSD members who aims to increase and promote female participation in science and technology professions, in scientific leadership, and in the decision-making processes at the national level.

> *"South African universities and research institutes host the largest number of OWSD fellowship holders in the world studying towards a Masters or PhD. There are currently 30 fellows from 13 African countries studying topics ranging from engineering to mathematics to agriculture at ten institutions." – ASSAf Member and OWSD SA Chair Prof Jennifer Thomson*

There are several other formal channels for encouraging the inclusion and participation of women.

Gender in Science, Innovation, Technology and Engineering (GenderInSITE) is an international initiative to promote the role of women in science, innovation, technology and engineering, and to demonstrate how applying a gender lens to activities can provide deeper insights, more effective programmes and more sustainable outcomes in the context of development. As the southern African focal point for GenderInSITE, ASSAf hosted the first project workshop for GenderInSITE southern Africa in October 2014. The focus of the discussions was on gender and agriculture where initial contextual data were presented about the Southern African Development Community (SADC) region. Key target audiences/stakeholders were identified for further dialogue and implementation of the project.

Various arguments around shifting the balance of ethnicity of staff in universities and other research institutions refer to the time it takes for black scholars to reach the levels of experience required for professorships. True or not, this case cannot be applied in women's circumstances. (Butler-Adam, 2015) South Africa has a host of distinguished women scholars who are admirably suited to lead departments, faculties, universities, research foundations and institutes. ASSAf supports their right to be fully recognised for

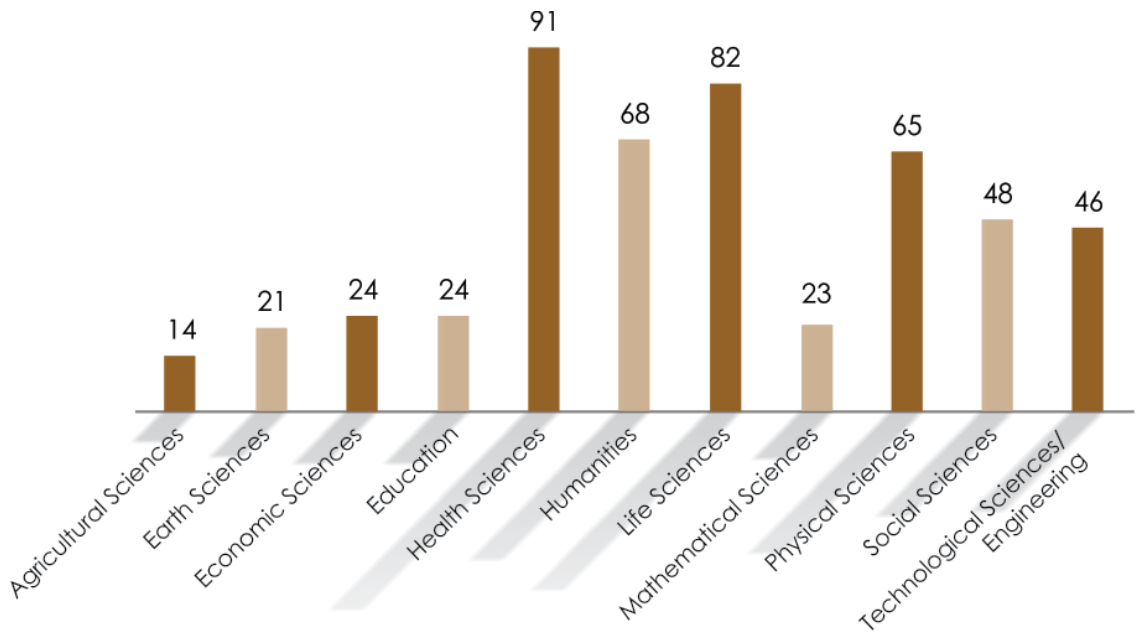
the research, teaching and management leaders that they are – and to be appointed accordingly.

Women in science activities remain an important focus within ASSAf and ASSAf aims to intensify its efforts to link with other national and international initiatives to find a coordinated approach to support the continued implementation of women in science activities.

Becoming a multidisciplinary apex organisation

In order to become the apex organisation for science and scholarship in South Africa, ASSAf has to be a truly multidisciplinary body. ASSAf's Membership embraces the full disciplinary spectrum and today does include many Members from the broad humanities and social science disciplines. ASSAf remains committed to ensuring that these disciplines are a focus of attention.

ASSAf Membership by Discipline 2016 (n=506)



The humanities and social sciences were included in ASSAf planning right from the start. The founders of South Africa's unified Academy of Science recognised the role of the social scientist to spot challenges and contributors to progress; to engage with policymakers; to analyse societal successes and to help define national targets.

ASSAf has always been aware that it had to remove barriers and obstacles to unleash the full development of intellectual capacity in South Africa. This includes demographics, race, gender, representation across the disciplines and the encouragement of interdisciplinary and transdisciplinary work.

The DST recognises that research is multidisciplinary and that economic growth in South Africa depends upon all disciplines cooperating to find the best solutions – from energy

issues, to education, water provision and economic issues. The Academy concedes that most of the research and research outputs of the country are produced by universities and science councils. The niche that the Academy occupies is that it is multidisciplinary and approaches things from multiple perspectives by professionally conducted mobilisation of the necessary and appropriate expertise. It is therefore well placed to focus the research being produced by various individuals and bodies in the country, and produce advice to the nation as an apex organisation. An apex organisation is one that brings everything together, to one point, from engineering, to the medical sciences and the human sciences and others.

Some of the most revolutionary breakthroughs in science and technology have happened on the margins of narrow disciplines. Transdisciplinarity is an innovative mechanism to engage knowledge production as a means of fostering a more inclusive society. In its consensus report on *Scholarly Books: Their Production, Use and Evaluation in South Africa Today* ASSAf refers to the possibility of deliberately designing the content of scholarly books to bring inter or transdisciplinary treatments of particular topics together in one volume to enhance the visibility of articles.

By orientation transdisciplinarity is an approach that recognises a united and borderless intellectual terrain. It is an attempt to formulate an integrative process of knowledge production and distribution in reaction to the twentieth century narrow discipline focus and hyper-specialisation. (Du Plessis, 2013)

It responds to the multi-layered challenges of diffused disciplines, interlinked socioeconomic problems, the impact of globalisation, the de-territorialised nation state, technological advancements, environmental concerns, agriculture and food security and health.

Education critical to meeting demand for STEM-capable workforce

Another obstacle to unleashing the full development of intellectual capacity in South Africa is the state of science and mathematics in South African schools. It has been termed a national crisis. The legacy of apartheid strongly influences this situation. South African learners have fared poorly in comparative tests of science and mathematics. As a result, the pool of potential scientists, engineers, health practitioners and future teachers of mathematics and science is severely limited. This, in turn, limits South Africa's ability to be internationally competitive, as well as its ability to provide the infrastructure needed for the well-being of the majority of its people.

ASSAf has therefore intervened in various ways to deliberate on these critical issues and make concrete proposals on how the situation can be improved. It established a Science, Technology, Engineering and Mathematics (STEM) Education Standing Committee in 2008 to provide strategic direction to the Academy's role in the STEM education field.

In 2009, ASSAf convened a forum on the state of science and mathematics in South African schools. The proceedings report entitled *Critical Issues in School Mathematics and Science: Pathways to Progress*, made concrete proposals on how the situation could be improved.

A follow-up forum looked at the interface between school and higher education in South Africa, which has often been characterised in terms of a discontinuity or 'articulation gap'. In October 2010, ASSAf hosted a workshop on Mind the Gap, to focus on whether the situation required a wider response involving revision of mainstream curricula. Delegates stressed the importance of rethinking entire undergraduate programmes and strongly agreed that a scholarly and informed response was required from higher education and that this response should draw on the current international scholarship around undergraduate teaching and learning in science and engineering disciplines.

Although not confined to STEM education, one of ASSAf's most widely cited consensus study reports on education is the 2010 report titled *The PhD Study* that looked into how to meet the demands for high-level skills in an emerging economy.

In May 2010, ASSAf firmly established its long-term interest in and commitment to Inquiry-Based Science Education (IBSE) by hosting a workshop on IBSE for Girls in partnership with NASAC, OWSD, and the Gender Advisory Board of the United Nations Commission on Science and Technology for Development (UNCSTD).

In November 2013, the SAYAS weighed in when they conducted an online survey of postgraduate students and postdoctoral fellows to gain a deeper understanding of the needs and challenges of young scientists in the country. The report brought to light new insights into how young scientists perceive the academic environment, and flagged several areas for intervention for tertiary institutions, government and industry to take South Africa one step closer to obtaining a more supportive and fertile research environment for young scientists.

ASSAf's commitment to IBSE gave expression to the initiation of a pilot project in ten primary level schools in Pretoria based on the French Academy programme of *La main à la pâte*. With strong support from the French Embassy in South Africa, the three-year pilot project was launched in November 2012 as part of the French season in South Africa. The programme was implemented as a pilot in ten primary schools in the Tshwane District.

In October 2014, ASSAf commenced a consensus study on *Revitalising Agricultural Education and Training* (AET). The aim of the study is to provide recommendations that will revitalise AET in South Africa from the perspective of research, teaching and learning, as well as the agricultural extension service.

The STEM standing committee has addressed controversial issues too. In 2008, ASSAf issued a statement on *The Importance of Teaching Evolution in South African High Schools*. The Academy recognised that teaching of evolution is a sensitive matter among some communities, but took the position that it was unwise and inappropriate for any group of citizens, religious or otherwise, to limit access of any young people to the means to understand the workings of the natural world.

Transforming into an Academy of the people

ASSAf is working hard to address transformation and will do more in future. It is working hard to become more visible and to come to understand the social condition in which the debates and developments in South Africa, on the continent and in the world at large are playing out. Transformation is key to addressing these issues.

Chapter 9: Providing Independent, Evidence-based Critique and Ideas

Modern science academies do not only have an honorific function, but pride themselves on their service to society and particularly, their science advisory role. The value of Academy-type studies is the provision of authoritative, objective and independent advice based on a particular methodology that is unique to academies.

Academy advice is able readily to draw on the 'brains trust' of the nation and from abroad, if necessary; is based on volunteerism and has the greatest possible freedom from vested interests; and very importantly, it is consensus advice that is generated from a panel of experts and thus represents a multiperspective view rather than the view of an individual consultant.

Policymakers are increasingly confronted by emerging issues with scientific underpinnings, and are under greater pressure to act visibly, impartially, effectively, and transparently in the public interest. Science-based advice is increasingly in demand.

Promoting effective scientific advice

In terms of the ASSAf Act, a key mandate of the Academy is to provide evidence-based science advice to government and the nation in support of policy development. ASSAf acknowledges that its role is to inform policy, not to make it; to act as a broker of evidence and knowledge, not as an advocate; and to promote the role of science and evidence in policymaking. ASSAf strives to identify needs for science advice by engaging with policymakers.

As a young national science Academy, ASSAf has so far been active in this area chiefly through its in-depth consensus studies, which aim to provide a set of strong recommendations derived by the peer-reviewed consensus of an expert, multiperspective panel. All Academy studies are focused on broad, strategically selected areas and are closely aligned with national priorities.

ASSAf's science advisory activities are guided by its standing committees, which provide strategic direction and guidance. Currently, ASSAf's studies are focused in the following broad, strategically selected areas, viz. health; biosafety and biosecurity; energy; environment; humanities; and STEM education. These are closely aligned with government priorities.

ASSAf also seeks to implement projects in collaboration with other science academies in Africa and abroad, in its efforts to influence regional and global policy.

ASSAf has expanded its science advisory activities to include the publication of not only in-depth consensus study reports, but also policymakers' booklets on key topics and commentaries on national policies.

The policy advice ecosystem in SA

In South Africa three statutory bodies: NACI; the Council on Higher Education (CHE); and ASSAf, are mandated to advise government on policy issues within the NSI.

The challenge for the Academy has been to create its own unique identity and intellectual space. ASSAf's niche in the science advisory space is formal advice, in which the output is an evidence-based report that is a product of a formal mechanism based on a set of protocols. Consensus studies anchor this activity because of their unique Academy methodology. ASSAf acknowledges that there is a need for both formal an informal advice, and favours the ecosystem approach in which there is space for a range of advisors besides its own role as the national science academy.

The Academy provides locally based or 'home-grown' advice, as opposed to external advice based on limited knowledge and experience of local conditions – the value of this cannot be overstated in Africa, where the bulk of advice to governments tends to be driven by the donor community.

The Academy's well-developed international networks and access to a wide body of intellectual capital in sister science academies can enrich the solution to a local problem.

The focus of the Academy's work is on the scientific analysis of already published or available, enquiry-generated evidence that can help policy development in South Africa, rather than on prospective research; this distinguishes its niche from that of the science councils such as the CSIR and the HSRC.

> *ASSAf's work is multidisciplinary and able to address complex issues that transcend disciplinary boundaries." – ASSAf Executive Officer Prof Roseanne Diab, 2016*

Reports may be self-generated or commissioned by a client, such as a government department or public or private organisation. In all cases, the reports are available in the public domain, the findings and recommendations are widely disseminated electronically through press releases and to ASSAf's stakeholder data base and an official launch is held. Thereafter, individual face-to-face meetings with key stakeholders are held to further disseminate the report findings and recommendations. These stakeholder engagement meetings are an integral part of the project cycle and critical to increasing the impact and uptake of the reports. In this respect, the impact and uptake is continually monitored long after the launch of the report.

Reviewing the policy landscape

Science academies are well suited to step back from the immediate policy concerns to advise national governments on the strength of the existing scientific landscape and whether it is likely to be able to provide the types of interventions that will be needed in the future to shape better policy.

> *Evidence-based knowledge is especially vital in developing countries where resource constraints preclude chances of entertaining any dubious solutions and experiments from elsewhere which might result in harmful consequences. Evidence-based advice therefore requires closer co-operation between government, research-based organisations and national academies of science to ensure that policymaking and planning draw on the best available information." – Minister of Science and Technology Mosibudi Mangena, ASSAf Symposium on Evidence-based Advice, 2006*

In 2009, Naledi Pandor succeeded Mosibudi Mangena as Minister of Science and Technology. Mangena, being from a minority political party, had limited clout. Pandor, on the other hand, is from the ruling party. This has ensured greater impact for the entities reporting to her department. As a member of South African President Jacob Zuma's cabinet she had cabinet sway. Pandor believes strongly that science and technology is not limited to the Department of Science and Technology alone, but is relevant to all departments. She promotes the concept of a knowledge-based economy within all departments.

Through powerful ANC ministers and its own achievements and recognition, ASSAf has emerged as a key advisory body to a number of government departments. It was ASSAf that suggested government create permanent, interministerial committees for the integration and coordination of research and to understand and address the problems of departments through science and technology.

> *Back in 2006 your President, Robin Crewe, wrote the following in ASSAf's Annual Report: 'The primary challenge for the new council is to establish the Academy as the preferred source for evidence-based advice on issues of national concern'. I think that the Academy continues to make good progress towards achieving this objective." – Minister of Science and Technology Naledi Pandor, ASSAf Awards gala dinner, 2011*

In his briefing to the Parliamentary Portfolio Committee in 2011, ASSAf President Prof Robin Crewe reminded the Parliamentarians that the Academy had been developing its policy advisory role through several methods. He explained how the Academy had a complementary role to other science councils and it did not overlap. Its advice was independent, objective, based on volunteerism, based on rigorous analysis of evidence and peer review, multidisciplinary and transparent.

ASSAf has a strong relationship with the DST as it was responsible for the Academy and via the DST it had been trying to reach the other departments to share the value of the Academy.

Consensus studies, an ASSAf flagship

The consensus study methodology involves assembling expert panels that deliberate on a topic and reach consensus on a set of strong recommendations based on the evidence gathered. It yields a substantial consensus report which aims to influence policy and to have a long-term impact. To date, ASSAf has completed 22 such studies and is in the process of undertaking an additional five.

Consensus study reports involve the consideration of primary and secondary evidence on a policy question or issue by a panel whose members collectively possess the expertise needed to address the question or issue. Depending on the issue, panels may include non-academy members.

> *The methodology for our consensus reports is well defined and unique to academies. The panels of experts are appointed by Council and comprise members from diverse fields and specialities. The reports are peer reviewed. This is ASSAf's strongest product." – ASSAf Executive Officer Prof Roseanne Diab, 2016*

Panel members are appointed on the basis of expertise – ensuring a balance of perspectives, gender and race and absence (or clearly defined and admitted in advance of the study) of a conflict of interest. The panel of experts is chaired by an ASSAf Member appointed by Council.

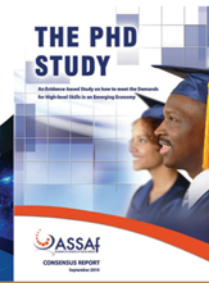
Report on a Strategic Approach to Research Publishing in South Africa

2008
2009

Revitalising Clinical Research in South Africa

2009
2009

The PhD Study: An Evidence-based Study on how to meet the Demands for High-level Skills in an Emerging Economy



2010
2011

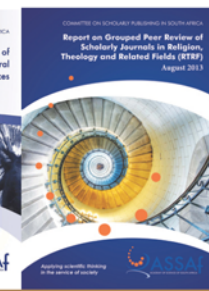
The State of Humanities in South Africa – 2011

2011
2011

Report on Peer Review of Scholarly Journals in the Agricultural and Related Basic Life Sciences

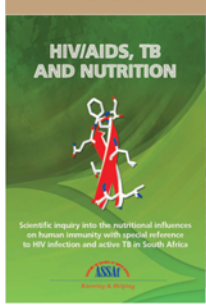
2011
2013

Report on Grouped Peer Review of Scholarly Journals in Religion, Theology and Related Fields

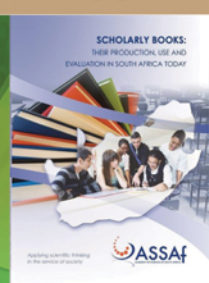


2013
2014

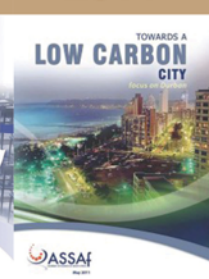
HIV/AIDS, TB and Nutrition



Scholarly Books: Their Production, Use and Evaluation in South Africa Today

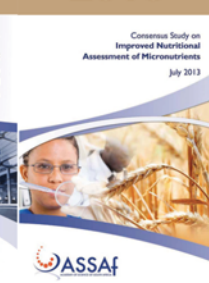


Towards a Low Carbon City: Focus on Durban



Report on Peer Review of Scholarly Journals in the Social Sciences and Related Fields

Consensus Study on Improved Nutritional Assessment of Micronutrients



The State of Energy Research in South Africa

Their main task is to review available evidence, conduct further research (should there be a need) and seek agreement (consensus) on the major questions or concerns in the area of inquiry. Consensus is usually expressed as findings, conclusions, and/or recommendations in publicly released statements, reports, or brief advisory documents.

Before the consensus study report is approved by Council and released, it is peer reviewed by independent and external reviewers who are experts in their respective fields. The peer-review panel of three to four members consists of international and national experts.

ASSAf's guidelines for advisory studies are the bedrock upon which its success has been built.

The Academy issues first consensus study report on Scholarly Publishing

ASSAf's first major consensus report on research publishing in and from South Africa (commissioned by government) was released in 2006, just ten years into the Academy's existence. This was a major achievement for such a young national academy of science. Extensive process guidelines were developed to ensure that the panel-based reviews were independent, reflected a best consensus of multiple perspectives, and were of a high scholarly standard (including thorough peer review). This report was an important milestone in the development of a coherent and effective scholarly publishing environment in South Africa.

The central vision of *A Strategic Approach to Research Publishing in South Africa* was for quality-controlled and government-supported publication of open access journals of a sufficient quality to deliver local impact and international recognition. ASSAf's scholarly publishing initiative is related in Chapter 10.

In 2009, ASSAf issued *A Strategic Approach to Scholarly Publishing in Books in South Africa*, addressing issues relating to production, use and evaluation of scholarly books in South Africa. The study was commissioned by the then Department of Education to assist them with the recognition of books and chapters in books as a component of the research output of higher education institutions.

A groundbreaking report on HIV/AIDS, TB and Nutrition

Only a year after the landmark research publishing report, ASSAf on its own initiative produced another groundbreaking consensus report on the evidence base concerning possible nutritional influences on the pandemic diseases caused by chronic human immunodeficiency virus (HIV) and *Mycobacterium* tuberculosis (TB) infection. The findings contradicted the official view of the government and helped end a disastrous period of 'HIV denialism' in South Africa.

Study panel member, Prof Wieland Gevers recalls how the *HIV/AIDS, TB and Nutrition* report resulted in a lengthy critique in *ANC Today* by then South African President Thabo Mbeki himself, in which he took issue not with the report, because he realised the report was not condemning the government, but was saying that science has failed to provide a basis for knowing how nutrition affects this infection.

The consensus report helped initiate a concerted national programme of science-based health care to mitigate the damage to society and the economy that these diseases were causing. This landmark study was widely reported internationally and acclaimed as a clear indication that Africa's science academies were independently capable of playing a significant role in addressing key issues affecting their societies.

A series of further studies linked to the health sector

In 2009, ASSAf released *Revitalising Clinical Research in SA*. Designed to contribute to building a national culture in which clinical research is seen as essential, and clinical trials are widely accepted and promoted, the report investigated how best to equip and encourage clinicians-in-training to embrace clinical research and evidence-based practice as indispensable elements in delivering effective health care. It explored how to

ensure that clinical research flourishes in South Africa under conditions that protect the rights and safety of individuals; as well as how to ensure that government, parastatal institutions, academia and industry interact more constructively. The report had a major influence on policy, funding of clinical research at universities and research chairs.

> *That we have five or less black African clinician scientists with a strong record of published papers – in other words real scholars – is pretty bad. Why? Well, we've simply not invested in producing them. The future of our country rests on the way we address this." – Study Panel Chair Prof Bongani Mayosi, 2011*

Revitalising Clinical Research in SA was the basis of a National Summit on Health Research organised by the Department of Health and led to a strategic government document based on the ASSAf consensus report.

Late in 2013, the Academy released a consensus report on *Improved Nutritional Assessment of Micronutrients*. The report looked at six key micronutrients known to play a vital role in pandemics. The study found that micronutrient malnutrition affects more South Africans than the previously perceived vulnerable groups. The report called on government to invest more resources in research on nutrition in general and specifically in the selected six micronutrients.

A couple of months later, in April 2014, NASAC in collaboration with eight African academies, including ASSAf, and a 16-member committee of experts produced a consensus report entitled *Preventing a Tobacco Epidemic in Africa: A Call for Effective Action to Support Health, Social and Economic Development*. The report made critical recommendations about tobacco-use prevention and control on the continent.

The report addressed the impact of tobacco on health, the environment, development, agriculture and the economy. It outlined strategies that should place tobacco control policies on the African leadership agenda. The report is a flagship for inter-academy cooperation in Africa and received extensive coverage.

> *Given that its recommendations are based on the best available evidence on tobacco use, prevention, and control in Africa and were reached through consensus and rigorous science academy processes, the committee hopes that this report will, in some way, contribute to the prioritisation of tobacco use, prevention, and control on the agenda of the African Union (AU)." – Quote from the report, 2014*

ASSAf established a Standing Committee on Biosafety and Biosecurity in 2009 to raise awareness of biorisks and promote the conduct of safe science. One of the first activities of the committee was to initiate a consensus study on *The State of Biosafety and Biosecurity in South Africa*.

> *Existing legislation and capacity to monitor and deal with biosafety and biosecurity risks are fragmented in South Africa – scattered across a number of departments such as Agriculture, Health, and Trade and Industry. This makes reporting and monitoring very difficult. It would be appropriate for one department, such as Science and Technology, to take overall responsibility for the implementation of biorisk assessment legislation in South Africa." – Study panel member Prof Iqbal Parker, July 2015*

In 2015, the consensus study report was released providing a critical overview of the implementation of biosafety and biosecurity measures in laboratories in South Africa.

PhD Study 2010

Sparked by broad consensus in the science community in South Africa that not enough high-quality PhDs were being produced to meet the developmental needs of the country, this study was commissioned by the NRF on behalf of several stakeholders.

> *In a country of 52 million people, only 1 800 doctorates are produced each year. One of the main challenges in doctoral education for South Africa is the undersupply of good candidates." – Study Panel Member Prof Ahmed Bawa, 2014*

The diverse nature of the research questions led to a broad research approach: several interlinked studies were carried out to gather and collate both quantitative and qualitative data.

Recommendations included external intervention programmes; expanded funding for doctoral studies in South Africa; a national planning strategy for dealing with high-level skills production; elimination of barriers and several others. The study influenced the way NRF funding is disbursed.

State of Humanities in SA 2011

In contemporary South Africa, the label 'humanities' is inclusive, drawing together the traditionally defined 'humanities', the 'social sciences' and the 'arts'. In 2011, ASSAf released another groundbreaking study, this time focusing on the crisis in the humanities in South Africa. Declining student enrolments in the humanities and the post-1994 government's heavy prioritising of science and technology disciplines were major causes of what many saw as a crisis in the humanities that threatened the survival of these disciplines in South Africa. The study found that, apart from isolated pools of excellence, the field had been 'intellectually stagnant' at universities for 15 years.

> *This study addresses issues that ASSAf has been occupied with for years now. We've felt there have been a series of perceptions about the humanities that needed clarifying – a picture that needed turning around – by means of evidence on what's actually happening." – ASSAf President Prof Robin Crewe, speaking at the launch in 2011*

One of the study's ten recommendations was that ASSAf redesigns itself so that its commitment to the humanities becomes more evident. The Academy subsequently reassessed itself in order to give weight to all the different parts of the academe.

The study clearly defined how scholarly work influences society and social change, directly or indirectly. The report called for urgent and decisive action from government to arrest the poor state of the humanities in the country.

A series of consensus reports on the environment and energy

Climate change is one of the most significant global issues of our time. Its importance to the continent of Africa rests on the vulnerability of its population to the impacts of climate change and the potential threat that it poses to sustainable development.

In 2011, ASSAf produced its first environmental study report. Cities are recognised as major contributors to climate change as they are densely populated areas with high levels of energy-use. ASSAf released a timely consensus report aimed at addressing both mitigation and adaptation opportunities for the city of Durban in May 2011. *Towards a Low Carbon City: Focus on Durban* explored the critical issue of transitioning to a low carbon city in the face of serious unemployment and the need for economic development. The report – an interesting collaboration with an international agency, the Danish International Development Agency (DANIDA) and local government, in the form of the eThekweni Municipality – emphasised the need to shift to a green economy.

Energy is an important driver of economic development. ASSAf has established energy as a core focus area and is building a substantial portfolio of activities around this theme.

The implementation of green technologies is an integral part of South Africa's green economy, making the study *The State of Green Technologies in South Africa*, released in 2014, both timely and important. The study documents the green technologies currently in use. It also identifies gaps in and opportunities for the use of these technologies, and makes recommendations to promote the growth of green technologies.

> *"This report is not one in which responsibility for implementation of recommendations rests with a particular government department. It is relevant for many, as well as industry, the non-governmental organisation sector and the private citizen. Ultimately, each of us has a role to play in ensuring that the green economy becomes a reality and not simply an aspiration." – ASSAf Executive Officer Prof Roseanne Diab, 2015*

The State of Energy Research in South Africa consensus study was initiated at the request of the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ). The motivation for the project was to improve the understanding of the energy research landscape in South Africa in order to support the South African National Energy Development Institute (SANEDI) to fulfil its functions in terms of energy research support and coordination in South Africa.

The study, released in 2014, comprised a synopsis of the current energy research landscape in South Africa with an analysis of the relevant national plans and acts, culminating in an account of expenditure into energy and energy-related research. The report concluded that inadequate coordination, insufficient funding and skills shortages threaten South Africa's energy future. Key recommendations of the study relate to a formal coordination mechanism to guide energy and energy-related R&D investment, increased funding and the prioritisation of human capital development in the sector.

There is an intense global debate about the merits and demerits of hydraulic fracturing or 'fracking'. ASSAf recently completed an in-depth study, in collaboration with the South

African Academy of Engineering (SAAE), aimed at investigating *The Technical Readiness of South Africa for Hydraulic Fracturing*. The report was published in October 2016.

Discipline-grouped peer review of South African scholarly journals

ASSAf is mandated to do discipline-grouped peer review of South African scholarly journals using the approved consensus process. These reviews make use of process-focused questionnaires for editors; multiple independent peer reviews focused on quality of content; face-to-face panel consensus; and reports finalised by the Committee on Scholarly Publishing.

The first of these consensus peer review panel reports, released in 2011 focused on the social sciences journals. It was followed shortly thereafter with a review of scholarly journals in the agricultural and related basic life sciences (also in 2011). The third of the consensus peer review panel reports reviewed scholarly journals in religion, theology and related fields. This report was completed in 2013. Two more reports were released in 2014, one a review of scholarly journals in law and related legal fields and other looking at scholarly journals in the health sciences and related medical fields. In 2015, ASSAf issued a discipline-grouped evaluation of humanities journals in the literature group classics, literature and languages.

Diversity in human sexuality 2015

Diversity in Human Sexuality: Implications for Policy in Africa was commissioned by ASSAf partly in response to a growing number of laws outlawing homosexuality on the continent, including in Burundi, Cameroon, Nigeria and Uganda. ASSAf initiated the study together with research institutes from Africa and abroad, as well as the Uganda National Academy of Sciences.

The report, launched at the Seventh South African AIDS Conference in Durban, South Africa in June 2015, examines scientific evidence on sexual practices and concluded that human sexual behaviour is naturally varied, and should not form a basis for discrimination.

> *"There was concern in the scientific community about a rising trend in Africa against gay people. As medical professionals, we believed Africa needed a consensus study from a panel of experts in Africa who could present the most up-to-date data and recommend future areas of research." – Prof Glenda Gray, Co-Chair of the study and President of the South African Medical Research Council*

The authors of the study suggest that governments have a duty to consider scientific perspectives and draw on the most current scientific knowledge when creating policy and enacting laws.

The report made global headlines, garnered unprecedented media coverage and earned a leader in the journal *Nature*.

> *What difference will this report make? It would be naive to expect that rational argument – scientific thinking – can draw the poison from the venomous attitudes that drive hatred and prejudice. But the report, if it is distributed widely, can still act as a useful tool for those who have the courage within Africa to oppose unjust laws." – Nature (Editorial, 2015)*

Policy advice has to be given at the right point in the policy process. The consensus approach can make it difficult to work to external timescales. This suggests that there could be occasions when different and more flexible policy advisory tools would be appropriate. Experience from around the world shows that the differing expectations and timescales of the research and policy processes are a universal problem.

Therefore, while consensus reports are valuable, ASSAf continuously develops different sorts of products and innovative new mechanisms for serving government and broader society.

Forums and citizen-centred dialogues

The advisory function espoused by ASSAf continues to evolve and is now also performed in various ways other than full consensus reviews. Well-organised and highly participatory forum-style workshops on problem areas can provide an indication relatively quickly of a 'beginning consensus' on priorities and possible solutions. 'Informed high-level consensus' opinions on key government strategies can be generated in short order by well-constituted expert panels if required urgently. Concise position papers can be released on matters of public controversy or confusion.

ASSAf can also act as a channel within the country for the dissemination of consensus reports and advisories emanating from regional or global academy groupings or agencies, such as those produced by the IAC. In every case, the ASSAf Council is charged with the final approval-and-release decisions, based on process correctness and scholarly quality: the Council is publicly accountable for maintaining the good reputation of ASSAf but does not 'second-guess' the findings and recommendations of its appointed panels.

There already exists, both nationally and internationally, a large reservoir of experiences of dialogue formats, including consensus conferences, focus groups, referenda and citizen juries that foster citizen debate. Regular dialogues on key science, technology and innovation topics should be built into the fabric of the science culture of our country.

Other evidence-based activities and products

Evidence-based study project activities form the core of the Academy's function and the number of projects expands and addresses an intentionally broader spectrum of national issues and priorities. Projects also play a key role in mobilising the ASSAf Membership in service on committees and panels. Reports produced as a result of the convening activities of the Academy are usually workshop proceedings reports, which provide a useful record of current understanding on a particular topic and highlight the major challenges faced. The value of such convening activities is their ability to assemble a group

of experts from both within South Africa and abroad and through the forum, focus on the key issues. Deliberations do not aim to make recommendations based on consensus but by pooling expertise it is possible to translate the knowledge into practical recommendations.

ASSAf also produces full-colour policymakers' booklets that are targeted at policymakers and aim to convey key messages in a concise and digestible format.

Another influential Academy output is in the form of statements that may be issued in the name of the Academy itself or jointly with Academy groupings. Such statements issue a declaration of a position on a topic and are widely regarded as influential and authoritative. To date, ASSAf has issued five statements in its own name.

The most recent form of policy-related output produced by the Academy is a policy commentary. This is a short report produced by an expert panel on a highly topical and relevant government White Paper or policy document. ASSAf's first such policy commentary was the ASSAf Commentary on the Integrated Resource Plan for Electricity 2010 – 2030. Since then a number of others have been produced.

Assisting with addressing issues of national concern

Helping raise the profile of persistent national problems and adding to social consciousness, serving as a 'ombudsman' for South Africa's hard-won democracy to ensure it remains intact is a core function of ASSAf. An Academy of Science is only of value to society if its government and its policymakers heed its advice. There is no doubt that ASSAf has influenced policy. The disagreement is over the extent to which it has achieved this.

> *Science academies of the kind that ASSAf aspires to be will be judged mainly on their track records in assisting society. A promising start has been made, and one can justifiably be optimistic about a second 20-year period of high-level achievement in this sphere." – ASSAf Founder Member Prof Wieland Gevers, February 2016*

ASSAf Member Prof Malegapuru Makgoba believes the Academy has tried and continues to try and convince government of its important role in society, but he says, "Government has not yet said 'wow'. The Academy's reports are solid. We have to keep trying. We have to keep marketing ourselves to them".

> *The honest answer is that we've not yet cracked it. ASSAf is on a journey and right now government is composed primarily of non-scientists. South African politicians generally have a low esteem of science. Some are even sceptical of science." – First ASSAf General Secretary Prof Malegapuru Makgoba, August 2015*

Makgoba believes, "An academy needs an enthusiastic, supportive government. In South Africa, our history is one of struggle and our government's focus is still on bread and butter issues. The priority is clean water, food and jobs and although science plays a role in meeting these demands, we have to realise that we are a new democracy and it will

take time before they come to us for advice, people tend to trust a politician before they trust a scientist".

Ensuring impact means ASSAf's focus and priorities have to be closely aligned with those of government and the DST in particular. The broad goals of government, applicable within the context of ASSAf activities, are: strengthening skills and resource base; regional development, African advancement and international cooperation; improvement of the health profile of society; improvement of rural development and food security, as well as improvement of environmental assets and natural resources.

ASSAf is mindful of the three strategic goals of the NDP.

"Poverty, inequality and unemployment represent a trio of challenges that play a decisive role in shaping national policy. The Academy, in line with its mandate, some years ago established a standing committee on poverty alleviation. Now revitalised as the Standing Committee on Science for the Reduction of Poverty and Inequality, this committee is set to give substance to its name through a series of activities that will serve to provide relevant advice to policymakers." – ASSAf President Prof Daya Reddy, 2014

Each of ASSAf's goals is carefully positioned in the context of the national science system. Finally, science academies are one of the most cost-effective ways of giving science advice to government; in many developing countries they are an under-utilised resource. Since academies rely on the expertise of their membership they are able to assemble the country's foremost experts on a particular topic and to ensure that the advice given is based on a system of volunteerism.

Teenage academy deemed worthy of frontline international attention

Only nine years after its first two study reports and many other consensus reviews, forum proceedings, advisories and position papers later, an ASSAf consensus report on policy issues concerning gender orientation in Africa, prepared in partnership with the Ugandan Academy of Sciences, was praised as courageous and timely in a lead editorial and feature article in *Nature*. The 'teenage academy' was now deemed worthy of frontline international attention.

To develop a complete mind: Study the Science of Art; Study the Art of Science. Learn how to see.

Leonardo da Vinci

Chapter 10: Scholarly Publishing – a Unique Mission of ASSAf

Scholarly publishing is at the very heart of ASSAf's domain of academic excellence in the service of society. It is a core Academy concern that is not part of the mission or profile of any other existing public sector organisation in the country.

The 'literature' (what has been published in reliably peer-reviewed and editor-approved papers) is a large and significant presence in the lives of researchers, whether based in higher education institutions or in other kinds of research-intensive organisations, public or private. Research journals are the lifeblood of living and evolving science, whether they are print and/or electronic, and wherever they are published.

The 2006 ASSAf report *A Strategic Approach to Research Publishing in South Africa* revealed (at the time) a 'mixed bag' in terms of quality and reputation among South Africa's accredited journals and a certain invisibility of South African research. The report was the catalyst for the establishment of one of the Academy's greatest achievements to date – its Scholarly Publishing Programme (SPP). In response to the report, the DST committed multi-year funding to ASSAf to address the crisis. ASSAf established the SPP to enhance the national capacity to produce and publish research, on the one hand, and to increase the quality and visibility of South African research publications, on the other.

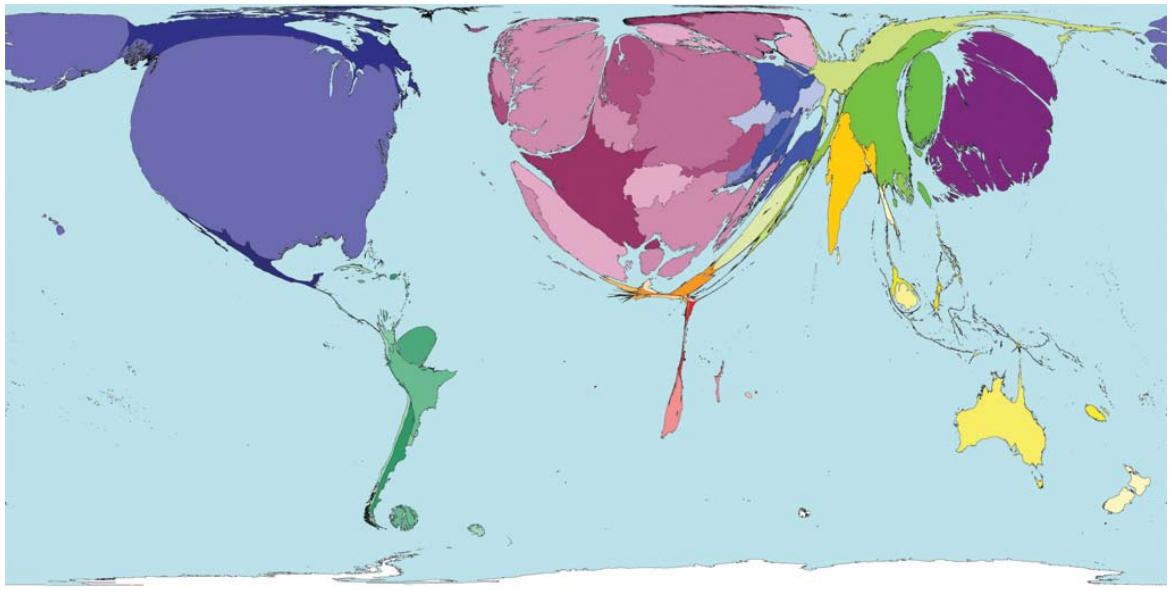
The programme had an element of fostering of a new generation of highly competent and productive scientists and scholars and recognised that human capital in science and technology (S&T) is probably the single biggest asset a country can have in promoting national development in the global, science-driven knowledge economy of the 21st century.

Implementation of the ten recommendations of the 2006 ASSAf report on research publishing – based as it was on the most detailed investigation of South African research productivity ever conducted – would represent precisely the kind of systemic intervention that would underpin other measures to improve the country's research productivity and capacity, while rendering them more effective and efficient.

The SPP is overseen by the Committee on Scholarly Publishing in South Africa (CSPiSA), whose work is in turn supported by the ASSAf Scholarly Publishing Unit (SPU).

Increasing the visibility of SA scholarly research

In 2001, the then DACST charged the Academy with the responsibility of developing a new framework for science publishing in South Africa. The Academy would take over the responsibility of publishing the *SAJS* from the NRF with a view to developing it into a 'Nature' for South Africa.



Scientific papers published 2001. Territory size shows the proportion of all scientific papers published in 2001. ***Source: http://www.worldmapper.org***

Prior to this, two strands of influence affected the publication of local scholarly journals in South Africa. The first was the establishment of the Bureau of Scientific Publications (BSP) that subsidised the publication of a number of existing journals. The 'Bureau journals' were an attempt to foster academic publication in South Africa and to make their products available to an international readership – quality of material was to be coupled to quality of production. In this respect the establishment of the Bureau was mimicking a similar development in Australia and could be seen as a mechanism for fostering home-grown talent.

The second influence was a new mechanism of funding universities, which rewarded them directly for the academic publications that they produced.

Both influences had a significant impact on the development of local journals, the behaviour of individuals, the financial sustainability of learned societies that produced the journals, and the institutions that received the 'output' subsidy. The Bureau was closed and only the *SAJS* continued receiving support, through ASSAf, on the basis of its international impact. The funding for 'outputs' of the tertiary institutions continued, although in a modified form. With the demise of the Bureau, the journals it once supported were obliged to seek other arrangements, with greater or lesser success.

> *These developments raised two related questions. The first was whether it was appropriate for the state to support the publication of (some) learned journals in the interest of fostering intellectual exchange. The second question was whether all of the articles, published in journals recognised for the output subsidy of universities, deserved to receive recognition, in view of the wide variation in quality of the material produced." – ASSAf President Prof Robin Crewe, 2006*

The Academy was commissioned in this context to undertake a study to address these two questions, with a view to making recommendations for the optimal development of policy in the future.

As from April, 2001, funding of the journals previously supported by the Bureau became the responsibility of the relevant scientific societies. DACST requested the then Foundation for Education, Science and Technology (FEST), the NRF and ASSAf to examine how a new policy and framework for research journals could be developed, and to make proposals for the management of South Africa's research journals. The new strategic framework sought to promote and enhance the standing of South Africa's research journals nationally and internationally; to improve the productivity and efficacy of the publications through different modalities, including electronic publication; and to establish the *SAJS* as a 'national asset' of high quality.

The project was initiated and piloted as part of an expanded profile, circulation and content for the *SAJS*, in a full text electronic version that would be accessible worldwide. The journals project led to the identification of journals requiring annual financial support, and the establishment of at least one flagship journal (*SAJS*).

The Academy sought funding for the above function from DACST and from other sources, while ensuring that operational revenues were maximised, and while working towards the above objectives.

This was the Academy's first big project. And, although the 2006 *A Strategic Approach to Research Publishing in South Africa* was designed to address specific questions that had been raised about the subsidy for scholarly outputs, its impact both in understanding international trends in scholarly knowledge production and in giving guidance to those fostering the publication of local journals was great. The report was developed and guided to a successful conclusion by Prof Wieland Gevers who initiated it during his tenure as President of the Academy and brought it to fruition as the Academy's Executive Officer, with the assistance of Dr Xola Mati as Study Director.

The report also addressed the new opportunities and risks related to the evolving electronic age and the highly significant paradigm shifts and with which an intermediate country like South Africa must vigorously engage.

ASSAf submitted its proposal for the new SPP to DST in November 2008, requesting funding over three years for concerted implementation of the ten recommendations developed in the 2006 research publishing report. The Department had previously accepted these recommendations, on the assurance that the Academy had also obtained the support of the Department of Higher Education and Training (which provides funding for accredited scientific journals), and other stakeholders.

> *"The common belief is that South African journals should be doing far better than they are, given the productivity of our best researchers and the exceptionally rich material available in so many fields in the 'unique South African laboratory'. Why do so many publications struggle? And can anything be done about it?" – Dr Graham Baker, 2008, then Editor of the SAJS*

ASSAf's proposal was designed to draw in all participants in the system to collaborate and bring about a vast improvement in the quality and quantity of research done in South Africa that is published; and in a much more visible way. It promoted a multipronged approach, embedded in international trends and efforts particularly to assist developing countries.

ASSAf recommended best-practice in editorial discernment and peer review, capitalising on technological innovations, judiciously enriching content to promote coherence and value, and providing the local scholarly community with opportunities for participating in the full range of scholarship-enhancing activities associated with the process of publishing original research outputs. The Academy proposed vigorously seeking financial sustainability from multiple income streams and accepting systemic peer review and periodic audit with a marked developmental focus.

Finally, the research publishing report recommended that DST takes responsibility for ensuring that open access initiatives are promoted to enhance the visibility of all South African research articles and to make them accessible to the entire international research community.

SAJS the leading multidisciplinary research journal in Africa

Established in 1903, the *SAJS* is the leading multidisciplinary research journal in Africa, and features a great diversity of original work by researchers throughout the country and abroad, concentrating on articles that have an appeal that is wider than that of single disciplines.

Peer-reviewed articles comprise reviews, research articles and research letters. Commentaries, news features and book reviews are published to keep readers informed of recent news and developments in science and research.

One of the key drivers of scientific excellence and innovation is the publication and dissemination of research findings. Many science academies across the globe, including ASSAf, publish their own journals.

In 2002, a nascent ASSAf took the bold step of assuming responsibility for the publication of the *SAJS*, with the aim of building the journal's reputation as an independent scholarly journal of the multidisciplinary type. At the time the journal was in sound editorial hands, but needed a visionary approach to take it from a paper-based journal that had a relatively narrow focus of 'natural scientific' interest to one that is entirely digital and open to good papers from all empirical fields of enquiry. (Diab, 2016)

Through the publication of the bimonthly *SAJS*, now in its 112th year of production, ASSAf is making a valuable contribution to high-level skills development and knowledge production. The *SAJS* provides an important outlet for scientific research in the region and showcases South African research to the international community.

Over the years, the *SAJS* has undergone major transformation as the Academy strives to increase the impact and relevance of its flagship journal.

A new editorial model

The journal's success is due in no small measure to the dedication of its succession of recent editors. The first of these was Dr Graham Baker, who arrived in South Africa in 1972 after a science publishing career with *Nature* in London. He set about the demanding task of taking the journal from a barely viable condition to a flagship multidisciplinary journal modelled on *Nature*. For 36 years, as full-time editor, he dedicated himself to the establishment of the *SAJS* as a high-quality, internationally significant journal that showcased South African natural science research to a global audience.

> *"To keep up with competitors abroad, the editorial office must help to bridge the gap between unsatisfactory initial submissions and the final articles in polished published form with which the authors and the journal are proud to be associated, and which good scientists are happy to cite." – Dr Graham Baker, 2008, then Editor of the SAJS*

Towards the end of 2008, ASSAf introduced a new editorial model, with Prof Michael Cherry as part-time Editor, supported by ten part-time Associate Editors in various disciplines. It was at this time that the focus of the *SAJS* was also deliberately broadened, specifically targeting the hitherto neglected humanities and social sciences. Since then, submissions in the fields of the humanities and social sciences have steadily increased, warranting a recent decision to expand from one portfolio into two (each managed by an Associate Editor). (Diab, 2016)

The journal was as of May 2009 made available on the Scientific Electronic Library Online (SciELO) South Africa open-access platform as the first pilot project of this exciting venture. This enabled increased visibility and accessibility of published articles for authors and readers.

Dr John Butler-Adam took over as part-time Editor-in-Chief in November 2012. At the same time, there was a rapid increase in the number of articles being submitted for publication from all parts of the world as the accessibility and reputation of the journal began to increase. The increased responsibilities in the ASSAf secretariat, together with the opportunities and demands of digital publishing, saw the creation of the post of online publishing administrator in 2013.

Digital publication of the *SAJS* has steadily become the dominant mode. Initially, the journal was published in dual mode, both print and digital, with the printed journal distributed free to ASSAf Members. In 2014, a decision was taken to discontinue the free distribution of hard copies and to focus on electronic distribution. Since, the ASSAf Council approved the discontinuation of the print version in favour of electronic distribution via the bimonthly 'Highlights of the latest issue' emails that now reach over 13 700 recipients. It is also available on the *SAJS* website, SciELO SA and various other online platforms.

Over the years, the *SAJS* has published articles in and related to every scientific discipline from archaeology to zoology (though few in the social sciences and humanities). Special theme issues created suites of papers by leading South African and foreign scientists, which would otherwise have found no publishing outlet in this country. They represented such fields as: cellular and developmental biology; galaxy structures (an active area of

astronomy to which South Africa has made pioneering contributions); palaeoanthropology and palaeontology (in which southern Africa is a unique source of abundant research material); studies of parasitic diseases (of great importance to African health care); microbiology; solid-state physics (there is no recognised physics journal published in Africa); environmental chemistry and atmospheric pollution (of concern to many interest groups in South Africa); climatology and marine science. The *SAJS* also became the only local outlet for peer-reviewed commentary on and analysis of science policy.

The *SAJS* – which is one of just 50 multidisciplinary journals in the world – is an integral part of ASSAf's core activities, responding directly to one of its five strategic goals, namely the promotion of innovation and scholarly activity in South Africa, with a special emphasis on all forms of interdisciplinarity based on the core and common role of empirical enquiry.

> *"ASSAf's role as publisher of the journal is critical to the strategic direction and successful implementation of its scholarly publishing and open access activities. The SAJS is at the forefront of many new initiatives that ASSAf is introducing and that will influence the future of scholarly publishing in our country." – ASSAf Executive Officer Prof Roseanne Diab, 2016*

In keeping with the dual content of the world's leading multidisciplinary journals, the *SAJS* now aims to be the foremost repository of editorial comment, scholarly debate and review, and science and technology policy analysis relevant to South Africa. This lofty goal is still a 'work in progress', but significant strides have been made.

> *"The 110th anniversary of SAJS in 2014 witnessed some stellar indicators of the journal's performance and scientific calibre as well as its impact, reach and visibility. The Web of Science impact factor for SAJS rose from 0.84 in 2013 to 1.03 in 2014, placing it at 20th in the Web of Science ranking of 55 multidisciplinary journals. That list is topped, and skewed, by Nature and Science, suggesting that 20th place is not, in fact, an unenviable position." – SAJS Editor-in-Chief Dr John Butler-Adam, April 2015*

The all-important Thomson Reuters Web of Science impact factor has shown a steady rise over the years and by 2016 was standing at 0.902, up from 0.506 in 2010. The *SAJS* at 1 848 cites ranks second among the South African journals on Thomson Reuters Web of Science in terms of citations.

Article-level metrics were added to the website in February 2016. Article-level metrics are metrics that indicate the impact of an article through views of the article page, downloads, citations, social media dissemination and media coverage and provide a more informative measure of the overall performance and reach of an article than does the impact factor. In less than a day after these metrics were introduced, recently published articles received up to 100 views and were downloaded up to 50 times.

The *SAJS* highlights – which include the full digital issues – currently are distributed to over 13 750 recipients; there were 50 500 visits to the home site in 2015 and the journal is also available on SciELO SA, Sabinet and various other online platforms. The journal has a strong Facebook and Twitter presence.

The over 5 600 active authors on the *SAJS* database and the similar number of reviewers are the lifeblood of the journal and have sustained the publication over the years. As the *SAJS* moves forward into a new future, many of the challenges remain the same. As conditions change, new ways will have to be found to address them.

A popular science magazine to profile the best of SA research

Among the recommendations in the 2006 ASSAf report *A Strategic Approach to Research Publishing in South Africa* was a proposal that a wide-ranging project be initiated by the then national Department of Education and the provincial education authorities to sharply increase the exposure of teachers, teachers-in-training and learners to local magazines that present the country's foremost scientific work in accessible form.

A popular science magazine was conceived by the *SAJS* as a further service to journal authors and as an opportunity to reach out to a wider South African public. The *SAJS* proposed an offshoot of the journal in the form of *Quest: Science for South Africa*. Active and reliable researchers could be identified through the pages of the *SAJS* and invited, along with others, to contribute different kinds of articles for a broader readership. The enthusiasm for the magazine by young school pupils as well as senior professional researchers and decision-makers testified to the reliability of the science on offer, and the role that research journals can play as a conduit between scientists and their public, and as a generator of new interest in science, countrywide, among young and old alike.

The first issue of *Quest* came off the press in 2004.

This full-colour, quarterly, popular science magazine is directed at a target audience comprising learners, educators and the general public. It aims to present the country's foremost scientific work in an accessible form. *Quest* is widely distributed to public high schools with science departments, Dinaledi schools and at national science events, such as SciFest Africa, Science Olympiads, and National Science, Engineering and Technology Week. The magazine is also available to the public by subscription.

In addition to the Editor, an editorial board comprising the Executive Officer of ASSAf, the Editor-in-Chief of the *SAJS* and a team of capable scientists and science communicators oversees the scientific integrity of the magazine.

Quest contributes significantly to ASSAf's science and society role; promoting science education and a culture of science in the population at large.

SciELO SA: Making new knowledge freely available to enhance SA research

One of the most ambitious components of the SPP was the implementation of the open access platform, known as the Scientific Electronic Library Online South Africa (SciELO SA) for high-quality South African scholarly journals. Central to the vision of the 2006 consensus report on research publishing was quality-controlled and government-supported publication of open access journals of sufficient quality to deliver local impact and international recognition.

Most South African journals had small print runs and were distributed to local libraries and subscribers. There was no international circulation, they weren't online and were virtually invisible.

The 2006 research publishing report recognised that scholarly publishers need support if South African research is to be properly disseminated and recommended the creation of a national open access platform for hosting and profiling the best South African journals, possibly along the lines of SciELO in Latin America.

It was envisaged that the platform would host selected journals that would profile the best of South African research and offer south-south collaboration.

Open access was recommended not only in response to the need for increased accessibility but also for higher levels of international visibility and citation counts to profile South African research in the conventional international rankings.

While the focus of this programme was fairly conventional, it was a major step forward, simply because it put publication of South African research in South Africa in the spotlight and, through links with the AAS, connected this to a broader effort to raise publication levels on the continent. The creation of an African citation index was also one of the recommendations in the ASSAf report on scholarly publishing in South Africa.

Since its inception in 1987 in Brazil, the online open access SciELO-indexed platform was successfully implemented in another eight countries: Chile, Costa Rica, Colombia, Cuba, Spain, Mexico, Peru and Venezuela. Then in 2009, SciELO was first established in Africa. The open access platform (free to publish and free to read), was established on the continent when ASSAf pioneered the implementation of online journals in the country, and culminated with the certification of the platform as a fully operational collection indexed in the SciELO Network Global Portal in April 2013.

> *"The SciELO SA collection started as a pilot in order to demonstrate its value and impact to the research community, evolving into an 'in development' status. Within the four years SciELO SA had achieved the 'mandatory quality criteria' – conditions a journal has to comply with in order to be published on the platform." – ASSAf Scholarly Publishing Director Susan Veldsman, 2013*

Science and Technology Minister Derek Hanekom could not attend the launch and so the newly certified SciELO SA was launched on his behalf by his science advisor Dr Khotso Mokhele (who also happens to be the Founder President of ASSAf), on 22 July 2013.

> *"Much of the academic literature that exists in the form of journal articles is based on research which was in fact funded directly or indirectly via government support, on the premise that knowledge is a public good. How then does it happen that academic publishers are given the right to retail this knowledge, often to the same taxpayers who paid for its generation in the first place?" – Science and Technology Minister Derek Hanekom, SciELO SA Launch, July 2013.*

Fittingly, the *South African Journal of Science* was the first peer-reviewed journal to be fully open access on the SciELO SA platform. By the time SciELO SA was launched in 2013, there were already 26 journals available on the platform. These included titles such as the *South African Medical Journal*, *South African Journal of Education*, *Water SA* and the *South African Journal of Animal Science*.

A rigorous quality appraisal process

Open access does not equate to 'self-publishing' – all articles conform to the traditional process of journal publishing, entailing critical reading by several peer reviewers who ensure that a rigorous standard of research is upheld. Each journal considered for inclusion on SciELO SA is required to conform to stringent quality control standards, ensuring that only the best journals are published online.

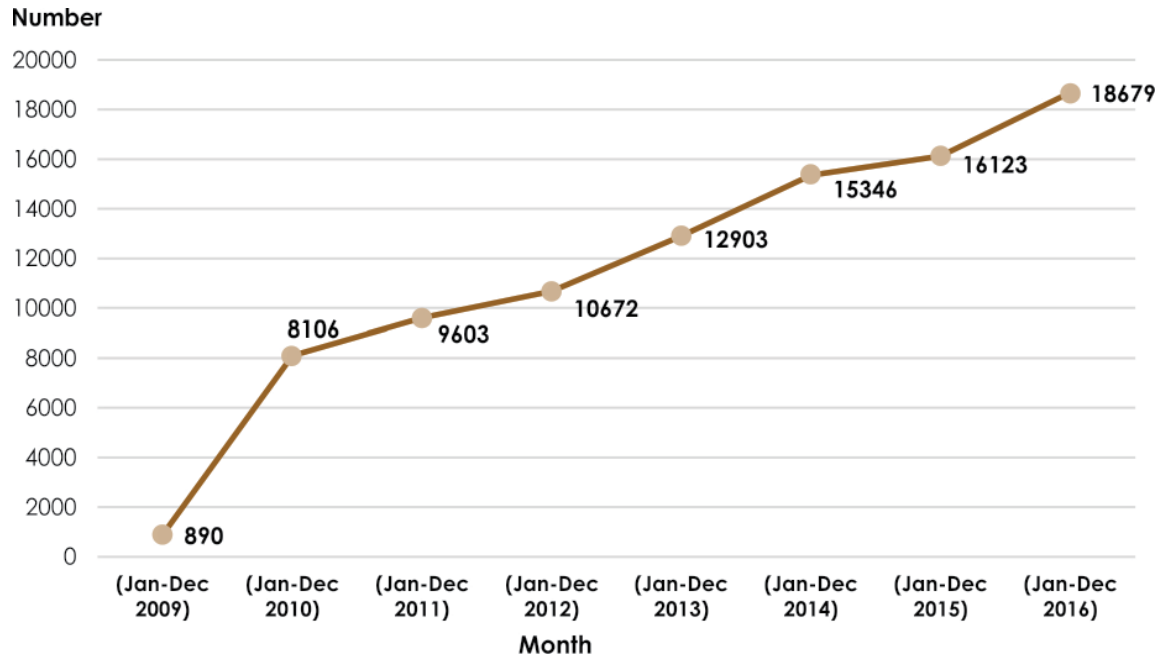
Journals selected must first go through a rigorous process of quality appraisal in which journal accreditation by DHET is considered, as well as the peer-review panel evaluations conducted by ASSAf. This ensures that the most reliable, credible and innovative research by South Africa's top researchers will be available in full to any person with internet access and the desire to learn, at no cost. Actual usage by scholars and scientists is monitored by the indexing system in various ways, including journal impact factors, and article citation and download statistics.

Inspired by the global movement towards the implementation of online journals and pioneered by the SciELO project, based in Brazil, SciELO SA focuses on strengthening the scholarly journal evaluation and accreditation systems in South Africa. All SciELO journals appear on the Web of Knowledge interface, which is run by Thomson-Reuters.

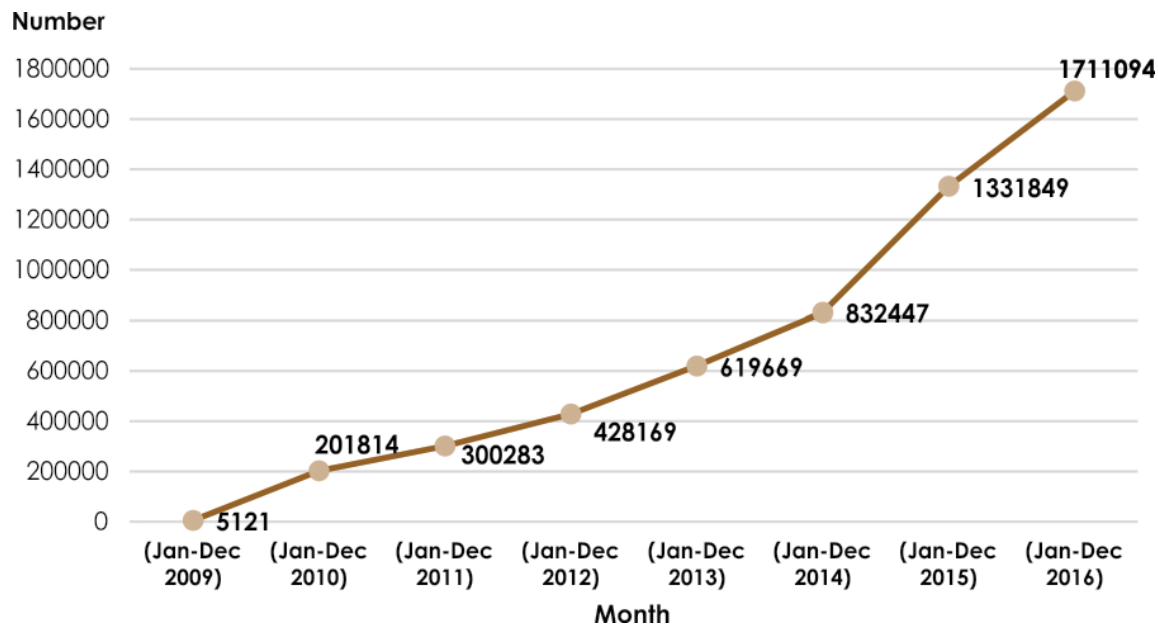
The SciELO SA collection is funded by DST and endorsed by the Department of Higher Education and Training (DHET) through its accredited indexes. As they are DHET accredited, journals appearing in the SciELO SA collection receive a subsidy.

Through the increased activity on the platform over time, the visibility of South African journals has been greatly enhanced. For example, in September 2014, the site was accessed by 193 countries and over 5 500 cities. Details of countries with the highest access rates may provide strategic guidance on the potential sphere of influence of South African publications as well as serve to highlight opportunities for future partnerships. Detailed statistics on the number of times a particular journal and even a particular article have been accessed are available. The contribution of such readily accessible data to the evaluation of the impact of articles and journals is self-evident. In a world where increasing emphasis is placed on impact of research output as a possible guide to research investment, such statistics have a major contribution to make.

Growth in number of cities accessing the SciELO SA open access platform



Growth in site visits to the SciELO SA open access platform



At the end of 2016 there were 65 titles in the collection. Since its inception in 2009 the collection articles have been viewed via SciELO SA 5.5 million times.

The SciELO network portal is fast becoming the most promising multinational journal indexing and publishing model in the developing world; and provides extensive opportunities for South/South collaboration between researchers. It is foreseen that eventually, after the ASSAf peer review panel evaluations are complete, more than 180 South African scholarly journals may be published on the collection.

The intention is for SciELO SA to gradually grow into a platform for quality African journals, as other journals from the continent that comply with the evaluation criteria can be hosted by the platform.

Additional scholarly publishing activities

The strategic goal of the SPP is to enhance the national capacity to produce and publish research, on the one hand, and to increase the quality and visibility of South African research publications, on the other. The SPP's activities are coordinated to achieve this goal.

Scholarly books

The publication of scholarly books is an activity that contributes greatly to the production of knowledge and the promotion of scholarship, yet there have been many challenges related to the recognition of books and chapters in books as a component of the research output of South African higher education institutions and the related subsidy from DHET.

In 2009, ASSAf published a consensus study report on *A Strategic Approach to Scholarly Publishing in Books in South Africa*. The report addressed issues relating to the production, use and evaluation of scholarly books in South Africa. One of the recommendations of this report, namely the establishment of a National Scholarly Book Publishers' Forum (NSBPF), has been implemented. It aims to raise peer review standards for scholarly books and collected works to the level of peer-reviewed journals, to improve public policy in respect of scholarly books and collected works and to enhance the impact of scholarly books in the development of a new generation of researchers.

Peer review of discipline-grouped South African scholarly journals

The peer review of disciplinary groupings of South African scholarly journals is a quality assurance process that is a prerequisite for journals to be loaded on to the SciELO SA platform. The process has to be credible, transparent, well-administered, and generally supportive of higher standards and greater general utility and significance, nationally and internationally. It is also expected that a robust review and audit system will help greatly to address problem areas and encourage enhanced functioning and quality of research journals published in South Africa

Reports on the completed peer review process for the first six disciplinary groups (Social Sciences, Agriculture, Law, Health Sciences, Theology and Humanities) have been published and a further eight groups are in the process of being rolled out.

National Scholarly Editors' Forum

ASSAf established a forum of editors of national scholarly journals in 2007, and since then an annual meeting of the National Scholarly Editors' Forum (NSEF) has been held. Approximately 100 editors of scholarly journals participate in these meetings.

Through the NSEF, as well as the publication of the *National Code of Best Practice in Editorial Discretion and Peer Review*, ASSAf aims to elevate the standard of editing and as such improve the quality of South African research publications. The NSEF is the only forum of its kind in South Africa and has become an entrenched event in the scholarly editing community.

Access to core commercial data bases

Access to scholarly journals is a challenge facing many tertiary education and research institutions in developing countries, with South Africa being no exception. The subscription costs to journals in core commercial data bases are becoming prohibitive and consume a disproportionately large proportion of library budgets.

ASSAf, with funding from DHET, has established an Advisory Committee comprising all the relevant stakeholders to advise on the implementation with respect to operational models, subscriptions and costing.

Through this project, ASSAf is supporting the DST with interventions to grow a competitive scientific and industrial base to support a knowledge-based economy, by providing equitable access to scholarly journals to all researchers in South Africa.

Evaluation of conference proceedings and books

ASSAf had a formal agreement with DHET to evaluate conference proceedings and books submitted to DHET by tertiary institutions for subsidy purposes. The adoption of a standard Academy methodology based on discipline-grouped panels comprising experts serving in a volunteer capacity has given credibility and transparency to the process and greatly enhanced researchers' understanding of the process. With effect from 2016, the evaluation of books and conference proceedings migrated back to DHET.

Online scientific writing

This service entails a web-based online scientific writing course for postgraduate students and young academic staff. A four-tiered modular system has been developed and is aimed at supplementing and enriching in-house offerings available at some universities and in making the resources available online and free for all postgraduate students across all South African universities.

A future challenge – Access to knowledge resources

South Africa's higher education system is confronted with three major priorities: to produce a highly qualified human resource base which is needed for national development;

to develop the next generation of academics to sustain and transform the system; and to produce high-quality research and innovation outputs that can enhance the country's global competitiveness. All three priorities are absolutely dependent on access to papers published by other scholars, local and international, in leading journals. Many of these journals are high-cost, commercial titles published by large multi-national corporations.

The challenge that lies ahead for ASSAf is to promote the National Site License initiative. The equitable model will be a more cost-effective and sustainable route for facilitating access to the intellectual resources required for achieving our higher education priorities. Without this, or the investment of billions of additional rands in higher education, we are unlikely to succeed in developing an equitable, diverse human resource base on which to build the knowledge economy.

The **unexamined** life is not worth living

Socrates

Science is global. Einstein's equation, $E=mc^2$, has to reach everywhere. Science is a beautiful gift to humanity, we should not distort it. Science does not differentiate between multiple races.

Abdul Kalam

Chapter 11: Unlocking Science as a Diplomatic Tool

At 20, measured against international standards, ASSAf is a very young academy and yet, when compared with many of the science academies in Africa, ASSAf is relatively well-established. The Academy seeks to develop and maintain productive partnerships with international partners and is contributing both globally and within Africa to the international community of science academies, while simultaneously striving to contribute to the solution of national challenges through its science advisory role.

ASSAf was determined from its inception to break down the infamous 'Limpopo curtain' that had prevented South African scholars from interacting with their northern neighbours and the continent in general prior to 1994. The South African Academy wished to be part of a cooperative regional academy system. The opportunity to embed itself in this way came with the ASADI sponsored by the US NAS from 2005 onwards, providing contact points, joint conferences and projects, and a substantial increase in the number of partner African science academies. The focus of mentoring provided through the initiative by US NAS was on best practice in the generation of evidence-based advice, and this assistance underpinned the central role of this activity for the African academies, including ASSAf.

Science is global, it is not bound by national borders, and its impact is felt beyond the coastlines of continents. Therefore ASSAf plays a role in the worldwide science ecosystem as well and one of its five strategic priorities is the promotion of national, regional and international linkages. Its vision is to establish, strengthen and sustain productive collaborations with international organisations with a view to enhancing capacity in science and technology, and its application.

Linking South Africa with international scientific communities

ASSAf places great store in its international partnerships which allow it to benchmark itself against the world's best. ASSAf's national, regional and international linkages are strategically selected to drive science and technology development in South Africa, the SADC region and Africa as a whole.

The Academy's international liaison function is divided into themes, namely strategic partnerships, overseas collaboration, African collaboration, gender in science and technology, and young scientist activities.

The apartheid era academic isolation had resulted in an 'academy isolation' as well. When ASSAf was born, those international connections needed to be (re)built. Because knowledge is universal, an academy is inherently an international organisation. ASSAf recognises the importance of being part of the international family of academies and has made a major effort to participate in external academy activities.

Another priority for the South African Academy has been internationalisation of South African science, with a focus on linking to international unions in order to play a role in

addressing global challenges. ASSAf has also emphasised scholarships across borders, South-South cooperation, and efforts to unlock science as a diplomatic tool.

Early efforts at (re)building international connections

The early efforts at building an international presence for ASSAf were spearheaded initially by two if its Founder Members, Prof Wieland Gevers and Prof George Ellis, in relation to the IAP and the IAC, the two major umbrella bodies.

The IAP is the worldwide science academy organisation, while the IAC is a body with legal status. The IAP brings together established global networks of academies of science, medicine and engineering into a new collaboration in which academies work together to support the special role of science and its efforts to seek solutions to address the world's most challenging problems.

In 2002, ASSAf was elected by the members of the IAP as one of 15 board members of the IAC and was represented on the board by Ellis.

To mobilise the world's best science, the IAC was established by the world's national science academies to provide expert advice to international bodies – such as the United Nations (UN) and the World Bank – and other institutions. The IAC aims to complement, rather than duplicate, the advisory roles of other scientific institutions.

The IAC completed, with input from ASSAf, a major study on a strategy for building worldwide capacities for science and technology. The report entitled *Inventing a better future: A strategy for building worldwide capacities in science and technology* was presented to UN Secretary-General Kofi Annan in New York on 5 February 2004.

The IAC also completed its study on science and technology strategies for improving agricultural productivity and food security in Africa in a report entitled *Realising the promise and potential of African agriculture*. Two South Africans served on the study panel: Bongiwe Njobe, then Director-General of the Department of Agriculture, and Prof Jennifer Thomson, a Member of ASSAf.

ASSAf has always been actively involved in the premier international science academy of developing countries, TWAS. Professors Ahmed Azad, Daya Reddy, Wieland Gevers and Valerie Mizrahi were among the first ASSAf Members to become TWAS Fellows.

TWAS manages a number of schemes for the promotion of science and technology in the developing world. It announced a TWAS Young Scientist Prize for South Africans, administered by ASSAf. The rules and regulations that had been compiled by the former General Secretary of ASSAf, Prof Iqbal Parker, were approved and an awardee, Prof Vivian Alberts, was selected by a special selection committee chaired by Dr Philemon Mjwara.

The award was made to Alberts of the University of Johannesburg in recognition of his research findings in the field of novel thin-film photovoltaic cells.

During the mid-2000s there were increasing numbers of bilateral visits to discuss scientific cooperation – with a particular focus on, but not limited to, South-South collaboration with contact with Nigeria, Cuba, Russia and India, among others. Because South Africa's politicians in the first democratic government were educated and had spent years in exile in Eastern Europe and other parts of the world, there was a flurry of activity around bilateral collaboration with countries such as Belarus, Ukraine and Russia.

> *I was one of the people who went with President Thabo Mbeki to Russia to sign the cooperative agreement. In Russia the president of the Russian academy is the equivalent of the minister of science and technology and so they wanted the agreement to be signed between the two academies. So there I was signing the document with Mbeki overlooking the agreement process." – ASSAf Founder Member Prof Iqbal Parker, July 2015*

During the early 2000s ASSAf Vice-President Dr Anthony Mbewu served on the InterAcademy Medical Panel (IAMP), which considers cross-national medical issues such as the huge burden of infectious diseases in developing countries. Prof Chabani Manganyi represented ASSAf on the International Human Rights Network, which mobilises international support for scientists who on political grounds are unjustly treated or prevented from practicing science.

Unfortunately many of the bilateral agreements signed in the early days did not develop into tangible activities. In the end it was agreements signed with Norway, Sweden and other west European countries later on that bore fruit.

Bilateral agreements and engagements enable ASSAf to partner with other academies in collaborative studies that address issues of mutual interest, to submit joint funding proposals to international bodies such as the IAP, and to ensure that at times of elections, ASSAf gets support from and provides support to its partners.

African academies of science

Determination from individual scientists to make their voices heard can go a long way towards bringing their expertise to bear on society's problems. But formalising this process through the collective voice of science academies raises the impact of science to a whole new level. There is broad acknowledgement that the development of scientific academies could help to put science to work in Africa and much has been achieved since the laudable work of the ASADI programme.

Self-elected bodies of accomplished scientists make a significant contribution to public discourse. There is an opportunity, in the rapidly developing polities of Africa, for similar academies to emerge. The existing academies were not involved, for example, in shaping the NEPAD, an important collaboration between Africa's governments whose plans include the creation of research centres and networks to tackle continent-wide woes, such as malaria and poor water supply. (Editorial, 2006)

Multilateral collaborations in Africa

Due to its history, South Africa has long been perceived as being completely at odds with the rest of the continent. ASSAf managed to reach out successfully in a way that few other bodies have been able to do. This was achieved through programmes such as ASADI and through organisations such as NASAC.

Established in December 2001, under the auspices of the largely honorific AAS and IAP, NASAC is based in Nairobi, Kenya. ASSAf was a founding member. Today there are 22 academies of science on the African continent, 21 of which are members of NASAC. AAS has a pan-African mandate and a strategic partnership with the AU and NEPAD, which could be used to the benefit of NASAC and for the advancement of S&T across the continent.

ASSAf serves as the Secretary-General of NASAC. The election of ASSAf to the Presidency of NASAC in November 2010 placed a significant responsibility on the South African Academy to assist with the establishment and growth of science academies on the continent. ASSAf President, Prof Robin Crewe, was elected as President of NASAC in November 2010 and took over the responsibility of steering the organisation to ensure that it is effective in science academy development.

At around the same time, ASSAf embarked on a regional academy development initiative in conjunction with NASAC, by hosting a workshop for the SADC region academies and representatives from universities in countries where academies do not exist. ASSAf is deeply committed to this initiative and has subsequently focused on raising awareness among government officials and university leadership within the region about the value of science academies. Plans are underway to source funding and to work together with specific countries on this exciting initiative.

The academies of South Africa, Madagascar (the oldest science academy on the continent), Mauritius, Zimbabwe and the AAS have joined forces to cooperate in the southern African region. They are working on readiness assessments for the establishment of science academies in countries where there is no academy, such as Namibia. They are also focused on making presentations on the role and value of academies to SADC science and technology meetings in order to garner support for academies in general.

> *Partnering with African academies of science is vitally important to ASSAf because we recognise that we are only as scientifically strong as our neighbours. South Africa is better resourced, so we have to assist in leveraging resources for other academies." – ASSAf Executive Officer Prof Roseanne Diab, 2016*

The group has identified areas of possible collaboration. These include science education; energy; food security; climate change; open access (position statement and awareness raising); open data (including the possibility of a central repository); genetically modified organisms (GMOs); water and sea and oceans (the blue economy).

African science academy development

Africa has experienced rapid economic growth over the past few years (more than 5% on average for the continent) and it is on the minds of governments and civil society around the continent to consider what to do in order to translate economic growth into social development, technological progress and more. Academies have a major role to play in the various national governments and across the continent in informing and influencing policymakers, providing science advice and instilling a scientific approach to the deliberations that take place.

> *ASSAf is in touch with the continent's priorities and can be a real uniting force to foster the spirit of Ubuntu among the academies of science of Africa." – Uganda National Academy of Sciences Executive Secretary Dr Christian Acemah, February 2016*

Several academies of science on the continent, including ASSAf, have therefore produced ASADA. Its vision is to have strong national science academies in Africa supported by their governments and playing an important role in their national science systems.

ASADA succeeds the major 11-year ASADI initiative – led by the US NAS and funded by the Bill & Melinda Gates Foundation – that formally ended in 2015. It is named ASADA in recognition of this second phase of academy development on the continent, which is distinguished from its predecessor in having been created and led from within the African academies of science themselves.

> *The ASADA vision is to have strong national science academies in Africa supported by their governments and playing an important role in their national science systems, together with a strong and financially sustainable network of academies (NASAC) able to fulfil its role as advisor to the AU and facilitate cooperative activities among academies." – Nigerian Academy of Science Executive Secretary Dr Doyin Odubanjo, ASADA workshop, February 2015*

The initiative is inclusive and the membership of francophone and lusophone African academies is encouraged. Efforts will be made to ensure the inclusion of countries that do not yet have established academies, as well as the presence of the humanities, arts and social sciences. Young scientists play a valuable role and are encouraged to engage effectively with ASADA.

In February 2015, the DST and ASSAf hosted an ASADA African Science Academy Development Workshop in South Africa. The 24 academies and other stakeholders represented at the workshop drew up an action plan for the second phase of African academy development. They produced a five-year strategic plan to guide science academy development in Africa in the future.

> *This workshop brings together African science academies to help strengthen national academies of science in order to better serve their purpose. It is also an opportunity to network and strengthen relationships between scholars on the African continent." – ASSAf Council Member and NASAC Secretary-General Prof Barney Pityana, ASADA workshop, February 2015*

The strategic goals of the plan are to position NASAC as the coordinator of ASADA and strengthen its role as the coordinator and premier voice of African science academies at a pan-African level. ASADA aims to initiate and strengthen science academies on the African continent in order that they may promote scholarly activity, honour distinguished scientists and fulfil their science advisory role to governments and their nations. ASADA's agenda includes fostering collaboration among science academies for the advancement of capacity development and science within Africa. Its focus – the development goals of Africa and the implementation thereof by promoting scientific activities that align with the *Africa Agenda 2063* and the *Science, Technology and Innovation Strategy for Africa* (STISA 2024) of the AU.

Ongoing activities between and among academies, as well as those spearheaded by the NASAC secretariat continue to be implemented. Future challenges include linking up with academies and science bodies in francophone and lusophone countries on the continent.

ASSAf's unique role in ASADA

The South African Academy has identified areas of possible collaboration with African academies. Having been through the process of establishing itself, ASSAf can play a key role in academy development initiatives in the continent. Its successful roll out of SciELO SA puts it in a unique position to promote the open access initiative on the continent. Additional focus areas identified by ASSAf include health (finding synergies with sister academies in respect of non-communicable diseases and early childhood development); environmental health; climate change and energy; green technologies and the green economy; women in science activities; and biosafety and biosecurity.

> *Our Academy has from the outset played a leading role in ensuring that ASADA, with a broader reach than ASADI, acts with purpose and a sense of urgency in promoting the development of academies, as well as their capacity to provide advice." – ASSAf President Prof Daya Reddy, 2014*

Putting science to work in Africa

As stated in an editorial in *Nature* in 2006, "The medical, scientific and environmental challenges facing the continent of Africa can seem simply overwhelming. Some of them, such as the provision of health care and basic scientific education, are bound to be expensive to address. But others could be tackled by less expensive and more subtle means: the development of properly functioning scientific academies in African nations." (Editorial, 2006)

By 2009, there were signs that several African academies were beginning to transform from mainly honorific societies to become active advisers on policy.

Over the years ASSAf has been a driver behind some fine examples of science in action on the African continent. The Academy collaborated with the United States Institute of Medicine (IOM) as well as other science academies on the continent on the topic

of tobacco control in Africa. The aim of the project was to bring the issue of tobacco control to the attention of African policymakers. NASAC, in collaboration with eight African academies, including ASSAf, and a 16-member committee of experts produced the consensus report mentioned in Chapter 9 which summarises the findings and makes critical recommendations about tobacco-use prevention and control.

The *Diversity in Human Sexuality: Implications for Policy in Africa* produced in 2015 is another example of excellent collaboration between African academies of science.

ASSAf and the other academies of science on the continent have worked consistently to strengthen and boost funding for science, technology and innovation for Africa.

In August 2014, a seminal US-Africa Leaders' Summit in Washington DC, brought together the leadership of several African science academies and foundations and their partners. US NAS, the NRF of South Africa, and the Carnegie Corporation of New York co-hosted more than 20 leaders from the science academies of Cameroon, Ethiopia, Ghana, Kenya, Nigeria, Senegal, South Africa, Tanzania, and Uganda. The academies highlighted their role in advancing a range of scientific, technology, and innovation issues in Africa and together planning for future innovative endeavours to bring about transformative change in Africa.

Dr Bernie Fanaroff, the South African Square Kilometre Array (SKA) project leader and Science and Technology Minister Naledi Pandor were among the keynote speakers. Other stakeholders included private and public funders of research in the USA, the World Bank and United States Agency for International Development or USAID.

> *The SKA remains a shining example of how international partnerships in science, technology and innovation can go a long way to build capacity in Africa." – Dr Bernie Fanaroff, Square Kilometre Array, speaking at the 2014 summit*

Additional strategic discussions to forge stronger partnerships within the agricultural sector were also concluded.

Some international cooperation highlights over the years

ASSAf has played a big role in inter-academy activities from early on. The reason for this may be linked to South Africa's political prominence internationally after 1994. It has served on the executive leadership of the IAP, IAMP and TWAS. ASSAf actively participates in TWAS activities, has a national chapter and as early as 2009, hosted the prestigious TWAS General Conference in Durban.

> *The TWAS conference was the highlight of 2009. It was judged by all who attended to have been a great success and propelled ASSAf into the international spotlight. The initiation of TWAS and Third World Organisation of Women in Science national chapters was announced at the conference and the plan is to host an annual young scientists' conference as the main activity of these national chapters." – ASSAf Executive Officer Prof Roseanne Diab, 2010*

ASSAf has hosted joint conferences and workshops with overseas academies in the following fields: environment and health; infectious diseases; and nuclear energy.

Some of the earlier international cooperation highlights included attending the G8+5 science academies meeting in Rome in March 2009 where ASSAf contributed to a joint statement of the 13 academies on climate change and the transformation of energy technologies for a low carbon future. A further statement compiled by NASAC, together with individual member academies, was issued on the brain drain problem in Africa.

> *Leading innovation nations invest significantly in developing international science partnerships. We do as well. We are keenly expanding our diverse portfolio of international partnerships in science, technology and innovation – especially with African countries." – Minister of Science and Technology Naledi Pandor, ASSAf and TWAS Regional Office for sub-Saharan Africa Young Scientists' Conference, 2014*

ASSAf Members hold positions in international bodies such as NASAC, TWAS, IAC and IAP. The Academy was an active collaborator on IAP-funded projects from early on and has always encouraged the development of science academies in the SADC region.

ASSAf annually hosts an outstanding international scholar in South Africa for approximately two weeks for a nationwide lecture tour. Known as the Distinguished Visiting Scholar programme, the purpose is to promote scholarly activity and to contribute towards strengthening scientific endeavour in South Africa. These lectures are extremely well attended and with effect from 2015, the number increased to two Distinguished Visiting Scholars per annum. ASSAf has plans to respond to the Minister's request to broaden the impact of this programme to younger scientists and the public.

In addition to the Distinguished Visiting Scholar programme, ASSAf co-hosts scholarly lectures that are open to the public. These lectures provide an opportunity for South African researchers to engage with leading international scholars and at the same time raise the profile of the Academy and promote relations with other organisations. The most successful regular series are those co-hosted with the Royal Society of South Africa in Cape Town. ASSAf recognises that this successful initiative must be expanded to other centres in South Africa as a means to stimulate scholarly debate more broadly across the country.

ASSAf has hosted the OWSD National Chapter since 2009. In 2014, ASSAf was awarded the bid as a focal point of GenderInSITE Southern Africa.

Early in 2016, ASSAf hosted the triennial IAP Conference and General Assembly in Hermanus.

In May 2016, ASSAf Member and Chairperson of the South African National Chapter of OWSD, Prof Jennifer Thomson, was elected President of the international organisation at its 5th General Assembly and International Conference in Kuwait.

An unfolding continental and global role

Today ASSAf's strategic partnerships portfolio seeks to develop and maintain productive partnerships with international partners that include other academies and their networks. Since 2008, ASSAf has engaged in collaborative and academy development work with various national science academies on the continent. Strong links with African science academies and NASAC have been established and ASSAf views continued and strengthened relationships as vital. To date, ASSAf has signed MoUs with Uganda, Nigeria and Mauritius and has partnered with these academies as well as others in Zimbabwe, Kenya, Cameroon, Sudan, Ghana, Ethiopia and Mozambique on many projects.

> *ASSAf goes out of its way to partner with African academies and plays an active role in the ASADA and NASAC initiatives." – ASSAf President Prof Daya Reddy, 2016*

Although recognised for its leadership role among science academies on the continent, ASSAf continues to consult widely with African academies and pursues collaborative programmes through MoUs in order to foster clear cooperative relationships on a continental scale.

Twenty years down the line, it is safe to say that the founding of ASSAf is a success. The principles underlying the process were simple and could be applied in any developing country. These principles can be used to help establish academies of science in countries where they do not yet exist, especially in Africa.

Towards the end of its first 20-year period, the 'Limpopo curtain' is certainly no more!

Today ASSAf serves and contributes to six of the international strategic partnerships that are aligned to the global networks. These are the InterAcademy Partnership; InterAcademy Council; InterAcademy Panel; InterAcademy Medical Panel; International Council for Science Regional Office for Africa and the TWAS Regional Office for Sub-Saharan Africa.

ASSAf has played a leading role in the establishment of the revitalised umbrella body, the InterAcademy Partnership, which encompasses the former IAP, the IAC and the IAMP. The InterAcademy Partnership has had strategic discussions with ICSU on future collaboration. ASSAf's relationship with TWAS is strong and the recent transfer of the hosting of TWAS-ROSSA to ASSAf is testament to this. ASSAf is therefore well positioned to promote international scientific activity and international interdisciplinary scientific programmes according to ICSU's mission.

ASSAf also participates in other S&T fora such as the Science and Technology for Society Forum and World Science Forums. Each of these networks provides ASSAf with an opportunity to increase its sphere of influence and further establish South Africa as a global player.

ASSAf is a favoured partner on many projects initiated by well-established science academies such as the US NAS and the German national science academy, Leopoldina. As of

2016, ASSAf has signed MoUs with the Austrian Academy of Science; Russian Academy of Sciences; Indian National Science Academy; Chinese Academy of Sciences; and the German National Academy of Sciences (Leopoldina).

The South African Academy is expected to give effect, through activities, to its bilateral agreements and would especially like to strengthen its relationship with science academies in key partner countries such as BRICS (Brazil, Russia, India, China and South Africa). The annual BRICS forum presents an opportunity for the national science academies of these five countries to collaborate and play a crucial role in advising their respective heads of state.

ASSAf has been the host organisation of the ICSU Regional Office of Africa (ROA) since May 2015 and of the TWAS Regional Office of Africa (ROSSA) since March 2015. The responsibilities attached to these two offices align closely with ASSAf's strategic goals and strengthen co-operation within Africa.

> *ASSAf is greatly honoured to be the new host of the TWAS Regional Office. We commit our resources to further the objectives of TWAS. The hosting represents an opportunity to strengthen our mutual interests in promoting young scientists and creating opportunities for them to become global players." – ASSAf Executive Officer and TWAS Fellow Prof Roseanne Diab, March 2015*

The expectation of ASSAf as the new host of ICSU ROA is that it will add value to and strengthen the contribution of ICSU ROA to African science. It is anticipated that in the process ASSAf will develop much closer ties with ICSU Paris, which are already on a very sound footing as a result of the ASSAf President's election to the position of ICSU President Elect.

ASSAf seeks to complement its envisaged partnership with ICSU ROA by becoming the adhering body to ICSU. For historical reasons, the NRF became the adhering body to ICSU. In most countries, the adhering body or national member is the national science academy. Now that ASSAf has established itself as a fully functioning national science academy, it is ready to assume the responsibility of becoming the adhering body to ICSU and offers the following justification for assuming this important role.

Hosting of ICSU ROA provides an opportunity to synergise and strengthen ASSAf's activities in Africa.

Chapter 12: Focusing on the Next Generation of Scientists

An aspiration, present but not explicitly articulated in the founding decisions of ASSAf, was to avoid the gerontocracy so characteristic of older academies. This was given substantive form by the creation of the ASSAf-affiliated SAYAS in the second decade of ASSAf's existence.

A representative voice of young scientists in South Africa

SAYAS was founded in September 2011 to be the representative voice of young scientists in South Africa. Twenty founding members were elected from the 150 nominations received.

Each year an additional ten members are elected. After five years of service, SAYAS members become alumni and are replaced by newly elected members.

To qualify for nomination, candidates should be in possession of a PhD or equivalent degree in any field of scientific enquiry, where science is defined broadly as encompassing natural sciences, social sciences, arts and humanities, medical sciences and engineering. They also have to demonstrate evidence of scientific excellence through a proven publication record, and receipt of honours and awards; as well as evidence of activities demonstrating service to society.

SAYAS members must be under the age of 40 years and within seven years from award of a PhD at the time of nomination.

> *"There is nothing more encouraging for a young academic than such a national scientific recognition, which also comes with high intellectual and social expectations and responsibilities. Accordingly, being a founding member of SAYAS gives me an opportunity to participate in scientific debates with other young colleagues both national and globally." – SAYAS founding member Prof Mpfariseni Budeli, speaking at the launch in 2011*

SAYAS contributes to the national strategic priority of strengthening the skills and human resource base of the country, with a focus on the next generation of scientists. Since its inception, SAYAS has inaugurated 60 members who were selected based on their academic excellence and service to society.

SAYAS aims to contribute towards solutions to national and global challenges facing society; provide a platform for young scientists to influence policy decisions; contribute towards the development of scientific capacity in South Africa through mentoring and role-modelling of future scientists; and foster opportunities for interdisciplinary collaborations among young scientists.

> *"Membership of the young academy is a great honour. It is an opportunity to contribute towards solutions to national and global challenges facing society. The SAYAS members represent the voice of young scientists in South Africa and provide a platform for them to influence policy decisions." – SAYAS Co-Chair Dr Tolu Oni, 2016*

Young scientists represent the future of a country's science and technology development and their inclusion from an early stage in the processes that build a country's NSI is critical.

The creation of SAYAS was a critical step to enable South Africa to reach its human capital development potential, and achieve its vision of becoming a knowledge-based society. Various initiatives aimed at young scientists have been implemented in South Africa, however, the value proposition of SAYAS is that it provides a platform to which the future leaders in science, technology and innovation in South Africa are affiliated, and which can coordinate young scientists' activities in an organised manner.

ASSAf supported the founding of SAYAS and continues to provide secretariat support and funding to support their activities.

> *"The future success of any academy of science is dependent upon the direct involvement of young people. It should not be a body of retired people. In South Africa we need to avoid this at all costs. The Academy needs to be vibrant and move with the times." – ASSAf Founder Member Dr Reinhard Arndt, 2015*

ASSAf is strongly supportive of SAYAS, collaborating with it on many activities and providing funding and secretariat services. ASSAf also plays a mentoring role to SAYAS, assisting it to execute studies aimed at providing evidence-based advice on issues relevant to young scientists. SAYAS members are also drawn into ASSAf panels and other activities.

Five years into its existence SAYAS is growing, redefining its activities and maturing. The secretariat support provided by ASSAf is central to the core functioning of SAYAS, while young academy members, in turn, participate in several ASSAf standing committees.

SAYAS sees a role for itself in developing young academies in Africa. It is seen as a leading young academy and is supporting others to strengthen regional networks.

Some SAYAS highlights

SAYAS hosted the GYA General Assembly and Scientific Conference in May 2012 in Johannesburg. More than 100 international young scientists attended the meeting, which was opened by Minister of Science and Technology Naledi Pandor.

An outcome of the meeting was the Sandton Declaration on Sustainability, which was subsequently presented by the GYA to the Rio+20 conference. Conference delegates also took part in various outreach activities at schools and higher education institutions to engage with South African youth and young scientists. Several research partnerships were established as a result of these actions.

In 2012, SAYAS launched the SAYAS Survey of Young Scientists, an online survey completed by honours, Masters and doctoral students and postdoctoral fellows in South Africa. The survey aimed to provide a deeper understanding of the profile and general needs of

young scientists in the country for alignment of strategic activities targeting their support and development.

Over a thousand young scientists completed the survey and the results were published in a report that was launched during the 2013 SAYAS General Assembly. The most interesting finding was that a total of 43% of respondents indicated that the reason for performing their postgraduate studies is that they wanted to pursue an academic career. This figure elevated to 58% in the categories of PhDs and postdocs. This highlights a knowledge gap regarding the developmental needs of the country (e.g. industry) and career planning by postgraduate students.

The results of the survey were shared in detail with the DST, NRF, SAASTA and other key stakeholders. SAYAS envisages this as a two-yearly survey, which will dovetail with a planned survey of postdoctoral fellows in South Africa.

Under the auspices of the German-South Africa Year of Science and funded by the NRF and the German Federal Ministry of Education and Research (BMBF), SAYAS partnered with *Die Junge Akademie* and the GYA to hold the Young Academies' Symposium on Sustainability. After a planning meeting in October 2012, hosted by SAYAS in South Africa, young scientists met again in Berlin in March 2013 to debate ways to harness novel solutions from environmental challenges with findings documented in a research article. A science-policy panel event was a highlight of the Berlin meeting when scientists and policymakers discussed the role of science in policymaking.

The first regional meeting of African young academies took place in 2014 in Nairobi with NASAC, the GYA and a few national academies. One of the working groups going forward from that meeting will look at developing regional partnerships and the structure of a network between the young academies, coordinating with other initiatives such as the IAP.

Innovative and creative youth

Young people are creative and innovative. SAYAS makes extensive use of the web and social media to communicate with its members and with the international community of young scientists.

In 2015, SAYAS launched a blogging platform, inviting four young writers to share their experiences as a PhD student throughout the year. These bloggers were selected through a nationwide competition, and each successful candidate received training in writing for the popular media, professional editing, and a small monthly stipend for each blog entry.

The SAYAS blog celebrates the process of science – from the perspective of young people in the midst of their postgraduate studies. It helps SAYAS achieve its twin aims of being the voice of young scientists, and helping bridge the gaps between science and society. The project was so successful that the blog was expanded in 2016 to include Masters students.

SAYAS manages a vibrant website, Facebook page, Twitter account and Google+ profile.

The young academy does not hesitate to explore new frontiers and the 2nd SAYAS symposium on Science and Society in Africa was themed: Fact, Fiction and Media: Re-imagining Science Engagement and its Impact. Held in September 2015, the event focused on the potential of engagements outside the domain of traditional science education – in particular, science non-fiction writing in books and printed journalism, science fiction, and science in images and sound. Science fiction writers, musicians, designers, astrophysicists and public health scientists were among the speakers at the symposium.

Sydney Brenner Postdoctoral Fellowship

Through the award of the prestigious postdoctoral fellowship, named after the former South African Nobel Laureate, Sydney Brenner, ASSAf aims to attract excellent young scientists in the field of molecular and cellular biosciences to undertake postdoctoral study at a South African institution. Now in its eighth year, this fellowship has become widely known in South Africa as an 'apex' award in its field. Due to financial constraints continuation of this award will be reconsidered in future.

Young scientists' activities

ASSAf hosts an Annual Young Scientists' Conference based on the international year theme (Biodiversity in 2010, Chemistry in 2011, Energy in 2012, Agriculture and Food Security in 2014 and Women Empowerment in 2015) which aims to give young scientists an opportunity to showcase their work and network with other young scientists in their field. The advantage of such a conference being organised by ASSAf is that young scholars are introduced to the notion of an academy and are encouraged to aspire to excellence.

> On your shoulders rests the challenge of giving science a face that inspires our youth
>
> President Nelson Mandela

The combination of mentoring sessions, in which young scientists receive skills on science communication and/or scientific writing, and engage with policymakers, will continue as an important and unique element of this conference.

Since 2006, ASSAf has awarded a Young Scientist Award sponsored by TWAS and the DST. Top young scientists have benefited from these awards and the awards have served to promote scientific excellence. In 2010, the award changed to an AU-TWAS award, with an increased purse. Each year two prizes are awarded to young scientists working in the fields of the life and earth sciences, and basic sciences, technology and innovation in South Africa.

ASSAf strives to promote the visibility of South African young scientists through the nomination of outstanding young scholars to the World Economic Forum (WEF) meeting, the TWAS Young Affiliates Programme, the IAMP Young Physicians Leadership Programme, and the Lindau Laureate meetings. To date, many young South Africans have benefitted from these programmes.

Scientific writing is a key element of human capital development and has been identified as a major challenge facing graduate students and emerging young researchers in South Africa. Many universities and organisations have responded to this challenge, developing supportive materials. The niche of ASSAf in this landscape is a complementary one, involving the development of a free online course system for self-help in scientific/scholarly writing, based on a four-tier system that utilises the expertise of ASSAf Members in the higher tiers to mentor young researchers.

Although not a scientists-only activity, ASSAf's very successful internship programme, at a junior level, draws in young professionals from all fields of endeavour. These individuals gain valuable workplace experience in the employment in the secretariat. The programme has been highly successful and has seen several interns appointed to posts in the Academy.

Science is a way of Thinking.

C Sagan

Part C: Into the Future

Many models of national science academies exist, ranging from those that have only an honorific function to those that have both an honorific and a science advisory role, to those that include under the academy umbrella, a range of research institutes engaged in primary research. ASSAf has adopted the 'working Academy model', similar to that of the Royal Society (London) and the US National Academies, widely regarded as the international leaders and the 'gold standard' in combining the honorific and science advisory functions. Their impartial and respected voices carry weight in government circles and it is such academies that ASSAf aims to emulate.

Academies of the kind that ASSAf aspires to be will be judged mainly on their track records in assisting society. A promising start has been made, and one can justifiably be optimistic about a second 20-year period of high-level achievement in this sphere.

> *"I'm an old man, but anything can change. Sit down and introduce a special approach to bring in the people we want: a transformation agenda. Let's respond to the challenge. At the end of the day, this Academy is still very young. Why was the Academy born? To change from what the other academies were: awards and meetings. ASSAf was designed to be a working body, not a place to come in suits and sit around the table in meetings." – ASSAf Founder Member Dr Reinhard Arndt, 2015*

ASSAf's objective and vision are timeless. There is no need to change that. But going forward, what should the Academy do differently in the next 20 years of its existence? Which activities should be expanded and enhanced? This final chapter explores these questions and ASSAf's potential role in answering them.

Chapter 13: Ever Forward

Yesterday's science informs our decisions today, while today's science will inform decisions of the future. ASSAf's role going forward is to help identify the knowledge needed to inform and assist policymaking that addresses socio-economic development; the environment; and societal uncertainty and risk over the next 20 years and beyond.

> *Science is at the centre of all human progress. It is critical to our development as a nation and as a continent. But science and technology cannot only be a tool to transition the focus of South Africa's economy – it must also have an impact on people's lives now." – Deputy President of SA Cyril Ramaphosa, October 2015*

While science-derived evidence should hold an increasingly privileged place, policymaking is much more complex than consideration of evidence alone. The values of the populations themselves become part of the decision-making. Often these values can clash with the conclusions of science as we have seen with the substantive group of individuals in some countries who remain sceptical about anthropogenic climate change for instance or reject the use of genetic technologies irrespective of their demonstration of safety. This is the realm of post-normal science and science-informed policymaking, not technocratic decision-making. And it is why robust and effective science communication is so important. (Gluckman, 2016)

In the interaction between science, society and policymaking, the boundary role of science advising also includes science communication both for reasons of transparency and for trusted communication in crises. 'Science advocacy' is also inevitably part of the policy process. But this is distinct from the brokerage of knowledge that is essential to trusted and effective science advice provided by an academy.

ASSAf has to take all these developments into consideration as it attempts to assist society in making decisions about the future that are informed by evidence-based studies, conducted by experts, from multidisciplinary perspectives. It has to increasingly monitor uptake of the evidence provided and it has an important role in sharing the findings with government, parliamentarians, decision-makers, the media and society at large.

ASSAf's strategic priorities for the future

The strategic goals of the Academy:

- Recognition and reward of excellence
- Promotion of innovation and scholarly activity
- Promotion of effective, evidence-based scientific advice
- Promotion of public interest in and awareness of science and science education
- Promotion of national, regional and international linkages

ASSAf's strategic goals remain unchanged into the future as they capture the key overarching goals that embrace all of its activities. However, within this framework, there are certain areas where ASSAf believes it is well positioned to play an influential role and would like to target these areas for future development.

Expanding and enhancing the science advisory role

ASSAf's niche in the science advisory space is formal advice, in which the output is an evidence-based report that is a product of a formal mechanism based on a set of protocols. Consensus studies anchor this activity because of their unique Academy methodology. ASSAf acknowledges that its role is to inform policy, not to make it; to act as a broker of evidence and knowledge, not as an advocate; and to promote the role of science and evidence in policymaking. The Academy intends to work hard on identifying future needs for science advice by engaging with policymakers.

In addition to evidence-based studies on various topics, ASSAf is embarking increasingly on policy commentaries and assessment studies. It is also beginning to take on a new policy advocacy role, in line with trends at some of the well-established science academies, for example the Royal Society in the UK, by commenting on government white papers and policies. This role is being developed using existing resources.

> *"On a national level, the challenge for ASSAf in the future is to broaden its reach and raise its profile among other government departments that have not yet embraced the science advisory services that ASSAf can offer." – ASSAf Executive Officer Prof Roseanne Diab, 2016*

The Academy's role in the NSI is providing systematic, multi-perspective, evidence-based reviews of issues of national importance. Going forward ASSAf plans to expand and enhance its niche role in the science advisory space. The Academy has an extensive network of international contacts in this area, including the IAP and ICSU. It was represented at the first global meeting of science advisors held in association with the ICSU General Assembly in New Zealand in August 2014 and continues to be represented in the network that is forming.

On a continental level, ASSAf will be playing a leading role in positioning NASAC to fulfil its science advisory role to the African Union and will also be ensuring that the African voice is represented in science advice networks that are forming.

> *"Africa is rising and there are unprecedented levels of commitment to science and an understanding of its relationship to socio-economic development. Continentally there are huge, huge opportunities there for ASSAf to partner with other players on the continent and contribute to this exciting process." – ASSAf President Prof Daya Reddy, March 2016*

The South African Academy has a renewed focus on playing a leading role in the initiation and strengthening of science academies in the SADC region; and playing a leading role in Africa through submission of joint project proposals with African science academies to the IAP.

ASSAf's ties with national academies in both the developed and developing world will ensure opportunities to learn and grow. The Academy continues to be an independent, non-biased and credible source of science advice. The diversity of its Membership, em-

bracing the full disciplinary spectrum, enables ASSAf to focus on issues of a multidisciplinary, multi-sectoral nature and to bring the strengths of a fully inclusive approach to bear on the issues of national and international concern.

On 25 September 2015, the United Nations launched a set of 17 Sustainable Development Goals (SDGs) with targets for achievement by 2030. From ending hunger and ensuring food security, to combating climate change and ensuring sustainable use of the oceans, science is at the heart of many of these goals.

But how do governments and other actors integrate the best science into their implementation plans to achieve one or other of the SDGs? By bringing together nations' top talents, academies of science, medicine and engineering have long played the role of synthesising the latest scientific results and providing credible, independent, peer-reviewed advice to policymakers. ASSAf will join the science academies of the world in helping address the SDGs over the next decade and a half.

Membership transformation

ASSAf strives to reflect more accurately the changing profile of South African scholars. The challenge of changing its Membership profile, while simultaneously maintaining a merit-based science academy, is being addressed proactively through a number of actions. ASSAf is also committed to promoting women in science activities and highlighting the importance of applying a gender lens in activities that it undertakes.

Transformation of the Academy's Membership is essential to ensure legitimacy, to enable full participation by all potential candidates and to avoid perpetuating past historical imbalances.

> *"One has to knock on the doors of the politicians. Your knees might buckle from nervousness but do it. But it's more than just dispensing advice. It's also who brings the advice. A group of white males bringing advice to the black government of today may not be the way to go." – First General Secretary of ASSAf Prof Malegapuru Makgoba, August 2015*

> *Going forward we need to ensure that the political machinery and the politicians themselves really understand the role of science in national development. They need to understand the value of science in society. US President Barack Obama will assemble the scientists when he has to address an issue facing American society. It's a different approach. ASSAf is a young academy. We will get there. We have to market ourselves and convince the politicians of our value so that when facing a challenge they say, 'Let's call Njabulo Ndebele and hear what he has to say on this issue'." – First General Secretary of ASSAf, Prof Malegapuru Makgoba, August 2015*

Membership transformation is a critical issue that is on the agenda of each Council strategic planning session. To date, the possibility of an amendment to the Act has not been considered, but this might have to be considered as an option if other strategies are not working.

Managing ASSAf's relationships with government

Among all the entities that report to the DST, ASSAf is unique because of its independence and because of the Membership nature of its base. ASSAf therefore has to be vigilant and constantly clarify what it is and why it has to be independent.

The Academy is aware that it cannot be all things to all people and it plays a very specific role in the national system of science and innovation. It has a huge responsibility to engage with as many government departments as necessary in terms of science advice. ASSAf seeks to establish closer links with Parliament in order to ensure that legislators are able to engage in evidence-based decision-making and policy formulation.

Enhancing ASSAf's relationship with the business sector

ASSAf has embarked on a number of strategies to strengthen its relationship with the business sector. These include specialist fora on critical topics as a means of providing a platform where diverse stakeholders from academia, government and the private sector can meet on a regular basis to deliberate on matters of mutual interest that benefit from multi-stakeholder input.

Mindful of the fact that the NSTF provides a platform for diverse stakeholders to meet, ASSAf distinguishes its model from the NSTF model. The Academy's 'specialist' fora provide a valuable mechanism for providing diverse stakeholders with an **ongoing,** structured, science-oriented, opportunity for discussion and scrutiny of critical and sometimes contentious issues. An important distinction is that the forum can also provide strategic guidance on the nature of public workshops and consensus studies that may be undertaken. A good example of a potential forum is a Forum on Hydraulic Fracturing, as there is a need to bring participants from academia, the private sector and civil society together to discuss this issue.

The second objective aimed at establishing closer links with the business sector would be for the ASSAf President to constitute a high-level leadership forum comprising senior business and academic leadership in the country to address in a proactive way the role of science in economic development and the role of business and industry in fostering innovation. The niche of this forum would be its focus on senior leadership in the country. Such a forum is viewed as a vehicle for contributing to scholarly debates on critical national issues and as a means to bring together participants from diverse stakeholder groups such as government, business, civil society and academia.

Finally, ASSAf would like to engage with business and industry in an advisory capacity – and in particular to draw on the expertise of the business sector on fundraising.

Seeking to assume the role of ICSU adhering body

The Academy hosts ICSU ROA and will support the activities of ICSU ROA to facilitate closer linkages with NASAC, the TWAS-ROSSA, which ASSAf also hosts, and the AAS. The expectation of ASSAf as the new host of ICSU ROA is that it will add value to and strengthen the contribution of ICSU ROA to African science. It is anticipated that in the process

ASSAf will develop much closer ties with ICSU Paris, which are already on a very sound footing as a result of the ASSAf President's election to the position of ICSU President Elect.

ASSAf seeks to complement its envisaged partnership with ICSU ROA by becoming the adhering body to ICSU. For historical reasons, the NRF became the adhering body to ICSU. In most countries, the adhering body or national member is the national science academy. Now that ASSAf has established itself as a fully functioning national science academy, it is ready to assume the responsibility of becoming the adhering body to ICSU. Many of ICSU's priorities align with ASSAf's mandate as set out in the Act, e.g. "to promote common ground in scientific thinking across all disciplines, and to encourage and promote innovative and independent scientific thinking".

An integral part of the responsibility of the adhering body is the promotion of links between South African scientists and the global community of ICSU, through the local national committee structure. The accords well with one of ASSAf's strategic goals as outlined in its latest strategic plan.

Both science academies and ICSU share a common vision of a world where science is used for the benefit of all, excellence in science is valued and scientific knowledge is effectively linked to policymaking. ASSAf believes that it is best suited to be the adhering body to ICSU and anticipates that an opportunity will be given for the Academy to present its case to those entrusted with taking a decision on this matter.

Causes of concern

In the face of its good record, it is finally necessary to discuss caveats, the chief causes of concern on the part of ASSAf leadership and its supporters.

Resource constraints

One is the issue of independence, important for a body that needs government funding to maintain and build its infrastructure, as well as funding on a contractual basis for commissioned reviews or other forms of advice. The principle of accountability makes it appropriate that the use of taxpayer money by an independent (although statutory) academy should require formal proposals, budgets, financial reports and audits, and be assessed against performance. This unavoidably opens up the possibility of top-down control within a system where most other public entities are as clear-cut government agencies subject to such direct control, even within the parameters of their respective statutes. It stands to the immense credit of the government department responsible for ASSAf's public funding, the DST, and the government more broadly, that they have appreciated the fact that **the only good national science academy is an independent one**, and have acted accordingly.

Multiple-perspective, consensus-seeking review is best done by an academy

The second concern is the still inadequate realisation on the part of researchers in the public sector (universities and research councils), as well as those in the private sector, of the difference between the processes of prospective research into matters of impor-

tance, which may or may not create evidence for policy, and the systematic, consensus-seeking review of already available evidence by research-experienced experts with multiple disciplinary perspectives, in ways that are directly designed to provide an evidential basis for policy. While there is no *prima facie* reason why the second mode of investigation cannot be done in a university or research council setting, it is simply much better and more cost-effective when it is performed by an academy which can effectively mobilise any number of appropriately equipped volunteer scholars from any number of skills areas, see to a high level of quality assurance, and ensure transparency, all in a fully accountable manner.

The external aspect must not dominate the internal aspect

Finally there is concern that going forward the external aspect of ASSAf must not be allowed to dominate the internal aspect. The hosting of the offices of ICSU ROA, TWAS-ROSSA and other external activities puts a big strain on the severely limited resources of the ASSAf secretariat.

The leadership of the Academy is careful therefore not to allow the organisation to become a permanent bureaucracy. To discharge its mandate, the Academy manages a range of activities including supporting the development of young scientists, particularly black people and women. ASSAf has committed itself to its key Academy responsibilities first, to addressing South African issues and to the involvement of young people. SAYAS is considered hugely important.

The walk is a fine balance between local, regional and international and going forward ASSAf will continue to explore the opportunities that international linkages bring. These range from funding of project-related activities, to promotion of young scientists, capacity development of academies and participation in global and continental policy advisory activities.

Risk management

ASSAf's risk profile relates to three broad areas, viz. financial, human resources and reputational. In order to manage its financial risks, ASSAf will vigorously pursue options to secure, not only project-based funding which has been successful, but unfettered funding that could supplement ASSAf's core grant from government. In terms of human resources, ASSAf will ensure that retention of staff through good remuneration, good working conditions, and human resource policies that support and facilitate their development. The reputational risks will be managed by ensuring that ASSAf's independence is upheld in all contractual work with government or other agencies and ensure the delivery of high quality products endorsed by the ASSAf Council.

Lessons for the future

M&E takes a front seat

The Administration and Governance Programme is central to the efficient functioning of the Academy, providing essential administrative and financial support to the Council

and the secretariat. This programme is also responsible for all reporting requirements and compliance matters, including annual audits and strategic documents.

A monitoring and evaluation (M&E) component was added to this programme's responsibilities in 2014/15 and will form a major new focus going forward. As the Academy matures it has realised the need for proper impact assessment of activities to ensure its resources are used optimally.

> *We've mastered the art of producing excellent consensus reports so now we shift our focus to uptake, i.e. how well is that advice taken? As such, we have recently put in place an M&E Framework, which also serves to meet aspects of our compliance requirements." – ASSAf Executive Officer Prof Roseanne Diab, 2016*

As part of the M&E activities, ASSAf monitors media coverage, follows up on activities and committees and records that data which is in turn captured in reports.

Ongoing innovation remains an important activity throughout the organisation.

> *Innovation is not only about creating new products and systems, but rather about putting together existing ones in new ways to create wealth. The Academy is key to idea generation and the support of business (through funding and implementation), government (through policy and funding) and civil society (through adoption) is key to realising innovation." – ASSAf Chief Operations Officer Dr Xola Mati, 2015*

ASSAf's expertise lies in multiple organisations. It is about providing a think-tank for the sciences, generating ideas, bringing together fragmented ideas and packaging these ideas – not into products but rather into publications which may be used to inform policy and drive innovation.

The weight of the non-financial aspects of compliance

The Academy makes very efficient use of its still limited resource base, infrastructure and overall human capacity. However, because it runs a lean staff team, the Academy is struggling to meet the overwhelming weight of compliance related to the **non-financial aspects** of the Public Finance Management Act (PFMA). This will be a significant challenge to the organisation going forward.

ASSAf has engaged with the DST about this and is trying to find ways to manage the demands. The Academy is seeking clarity on this issue. ASSAf has reasserted that in some ways it is completely different to all other entities that report to the department and these unique aspects of the Academy need to be recognised and accommodated.

Reinforcing the executive leadership of ASSAf

The secretariat of ASSAf carries an enormous load, particularly since the declaration of the ASSAf Act in 2001, when opportunities to be involved in activities nationally and

abroad came faster than the Academy could support. ASSAf has been in a sense, a victim of its own success. Looking ahead the organisation needs to consider appointing one or two people at senior level to run with projects and support the Executive Officer. Ideally these candidates would be skilled, strategic thinkers, with PhDs; people who think beyond academia – and even industry for that matter – as a career path.

The appointment of such people is dependent upon additional funding.

The Academy also needs to start a succession planning process to ensure that the Executive Officer's position is immediately filled once the current officer retires in 2018.

Finding additional resources to avoid plateauing

Many would agree that considering what ASSAf does with the funding allocated to it, and compared to what it delivers, it is surprising that the Academy gets so little funding. ASSAf faces challenges in the execution of its mandate and the achievement of its goals, as it is dependent on volunteer contributions by its Membership. In addition, the relatively small budget that it receives limits the number of staff ASSAf can employ and the range of activities in which it can engage.

> *"One of the biggest threats to ASSAf is resourcing. If we continue at current levels then we are going to plateau at best and have difficulty in keeping on board a top-class secretariat. We need to continue with a top-class secretariat in the form of an Executive Officer supported by two or three top-level executives. Without that we are going to be only marginally relevant in future." – ASSAf President Prof Daya Reddy, March 2016*

ASSAf is aware of the pressures on the fiscus and has discussed its need for more funding with DST. The Academy is also looking at other potential funding sources. One of the motivations for the proposal to enhance ASSAf's relationship with the business sector is to establish a vehicle through which the Academy can engage with business and industry, in an advisory capacity, and in particular to glean solid advice on fundraising.

A home for ASSAf?

ASSAf is currently accommodated in rented premises in a business park in Pretoria. The Academy aspires to purchase or build its own building. The chief motivation is to avoid escalating rental costs that are increasing at a faster rate than ASSAf's baseline allocation, thus placing the organisation on an unsustainable path.

In addition, ASSAf proponents would like to see a permanent home for the Academy, a building befitting a highly successful national academy of science, a building that is properly functional and one where the secretariat can adequately host visitors and the like.

Capital funding is required to build or buy ASSAf's own space and ASSAf pursues this vigorously.

New and evolving roles

Public engagement in research

The widening gulf between science and society is a critical issue and underlies many contentious debates. If science is to be at the heart of transforming South Africa, then scientists have a duty to explain their work to the public and to encourage the youth of the nation to see science in their future. In accordance with its mandate, and the goals of most science academies around the world, ASSAf is engaged in a wide range of science education activities. ASSAf promotes awareness of science among the public and particularly among the youth through the publication and dissemination of *Quest: Science for South Africa* science magazine, release of press statements and active participation in key national science events. In its *Strategic Plan 2015 – 2019* ASSAf encourages the promotion of public awareness and understanding of science through proactive involvement of ASSAf Members in media statements on matters of current scientific interest.

Dialogues on key science, technology and innovation topics should be built into the fabric of the science culture of our country. ASSAf therefore participates in and organises various fora and dialogues that involve stakeholders and the public at large.

The DST's *Science Engagement Framework: Science and society engaging to enrich and improve our lives* issued in December 2014 identifies ASSAf as playing a key role in public engagement in research especially as far as the aspect of considerations of research agenda setting, community engagement and dissemination of research results in consultation with communities.

ASSAf is in the process of developing a Science Engagement Strategy to be considered and approved by Council. The goal of this strategy is to give effect to its slogan "Applying scientific thinking in the service of society". ASSAf aims to develop a relationship between science and society, and thus enable the sciences to achieve greater value by creating 'a scientifically engaged South Africa'.

Lectures, symposia, conferences and workshops

ASSAf co-hosts regional scholarly lectures open to the public. The most successful regular series are those co-hosted with the Royal Society of South Africa in Cape Town. ASSAf recognises that this successful initiative must be expanded to other centres in South Africa as a means to stimulate scholarly debate more broadly across the country.

ASSAf also partners with other organisations (e.g. Royal Society of London, *Akademie vir Wetenskap en Kuns*) as and when appropriate to host scholarly lectures and to publicise such lectures as widely as possible.

Academies are renowned all over the world for their convening power. Using their vast networks and building on their prestigious reputations, academies are readily able to assemble a group of experts drawn from a broad cross section of society (academia, civil society, business and government) to address a particular topic. In the same vein ASSAf

has hosted many successful fora on a variety of topics. Proceedings reports are always produced from such events and are widely disseminated to ASSAf stakeholders.

Initiatives for such symposia come from a variety of sources: an ASSAf in-depth study may elect to host a symposium as a means of gathering information; a symposium may be held in order to 'localise' a report published by a sister Academy; it may be initiated by an ASSAf Standing Committee or an ASSAf Member; and finally, upon request from a sponsor/funder.

> *ASSAf is well positioned to undertake such activities that are aimed at fostering dialogue and presenting cutting edge research and proposes that DST gives the Academy the opportunity to host such events and to prove our capability." – ASSAf Executive Officer Prof Roseanne Diab, 2016*

This convening strength of ASSAf has not been fully exploited and potential and capacity exists for ASSAf to take on an expanded role. Unique aspects of the Academy include its low overheads, ability to attract a scholarly audience and leading researchers, and as such bringing credibility to the forum, and the ability to rely on well-established national and international networks.

Science Media Centre

A long-term goal of ASSAf's is to establish a Science Media Centre to act as a facilitator between the scientific community and the media to improve public access to accurate, evidence-based scientific information about the scientific features of the day.

Many successful examples currently operate at other science academies. Science media centres facilitate links between the media and scientists so that the media has easy access to relevant scientific information. With ASSAf's easy access to expertise through its Membership and other networks, such a role would speak directly to the Academy's goal to enhance public awareness of science.

Additional proposed interventions include systematised science outreach and/or science engagement activities; the feasibility will be explored of incorporating science outreach as a formal component of continuing professional development obligations for registered, professional scientists; with the NRF, the feasibility will be explored of integrating wider societal input in the formulation of research questions or priorities at both programme and project level and sector-specific science outreach and /or engagement activities will be established, such as the Science, Technology and Innovation Summit that seeks specifically to facilitated cooperation between public and industry-based research institutions.

DST entities like ASSAf will be encouraged to implement interventions that deepen the dialectical engagement between science and society, by strengthening society's capacity to reflect critically on science-related matters. ASSAf's approach to consensus reports and conferences can and must be broadened to include also non-specialist members of civil society.

Conclusion

ASSAf has made incredible progress since releasing its first report in 2006. It is only nine years since. No other academy of science has made such rapid progress in such a short time. ASSAf is here to stay.

South Africa can look forward to a future secure in the knowledge that its national science academy is striving forever forward in applying scientific thinking in the service of society.

> If there is no struggle, there is no progress
>
> Frederick Douglass

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Appendix A: Office-bearers of ASSAf 1996 – 2016

1996

Title	Name
President	Dr Khotso Mokhele
Vice-President	Prof Jennifer Thomson
General Secretary	Prof Malegapuru Makgoba
Treasurer	Dr Otto Prozesky

1998 – 1999

Title	Name
President	Prof Wieland Gevers
Vice-President	Prof Ahmed Bawa
Vice-President	Dr Vincent Maphai
General Secretary	Prof Anthony Mbewu
Treasurer	Prof Iqbal Parker

2000 – 2001

Title	Name
President	Prof Wieland Gevers
Vice-President	Prof Jan Malherbe
Vice-President	Prof Chabani Manganyi
General Secretary	Prof Iqbal Parker
Treasurer	Prof Sibusiso Vil-Nkomo

2002 – 2003

Title	Name
President	Prof Wieland Gevers
Vice-President	Prof Chabani Manganyi
Vice-President	Dr Anthony Mbewu
General Secretary	Prof Iqbal Parker
Treasurer	Prof Sibusiso Vil-Nkomo

2003 – 2004

Title	Name
President	Prof Wieland Gevers
Vice-President	Prof Chabani Manganyi
Vice-President	Dr A Mbewu
General Secretary	Prof Iqbal Parker
Treasurer	Prof S Vil-Nkomo

2004 – 2005

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Anusuya Chinsamy-Turan
Vice-President	Prof Jonathan Jansen
General Secretary	Dr Philemon Mjwara
Treasurer	Prof Vivian de Klerk

2005 – 2006

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Anusuya Chinsamy-Turan
Vice-President	Prof Jonathan Jansen
General Secretary	Dr Philemon Mjwara
Treasurer	Prof Vivian de Klerk

2006 – 2007

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Patricia Berjak
Vice-President	Prof Jonathan Jansen
General Secretary	Prof Benito Khotseng
Treasurer	Prof Peter Vale

2007 – 2008

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Patricia Berjak
Vice-President	Prof Jonathan Jansen
General Secretary	Prof Benito Khotseng
Treasurer	Prof Peter Vale

2008 – 2009

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Patricia Berjak
Vice-President	Prof Jonathan Jansen
General Secretary	Prof Wieland Gevers

2009 – 2010

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Patricia Berjak
Vice-President	Prof Jonathan Jansen
General Secretary	Prof Wieland Gevers
Treasurer	Prof Francis Petersen

2010 – 2011

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Patricia Berjak
Vice-President	Prof Iqbal Parker
General Secretary	Prof Hester Vorster
Treasurer	Prof Sunil Maharaj

2011 – 2012

Title	Name
President	Prof Robin Crewe
Vice-President	Prof Patricia Berjak
Vice-President	Prof Iqbal Parker
General Secretary	Prof Hester Vorster
Treasurer	Prof Sunil Maharaj

2012 – 2013

Title	Name
President	Prof Daya Reddy
Vice-Presiden	Prof Patricia Berjak
Vice-President	Prof Iqbal Parker
General Secretary	Prof Hester Vorster
Treasurer	Prof Sunil Maharaj

2013 – 2014

Title	Name
President	Prof Daya Reddy
Vice-President	Prof Patricia Berjak
Vice-President	Prof Iqbal Parker
General Secretary	Prof Hester Vorster
Treasurer	Prof Sunil Maharaj

2014 – 2015

Title	Name
President	Prof Daya Reddy
Vice-President	Prof Iqbal Parker
Vice-President	Vacant (Previous incumbent, Prof Patricia Berjak passed away on 22 January 2015)
General Secretary	Prof Himla Soodyall
Treasurer	Prof Sunil Maharaj

2015 – 2016

Title	Name
President	Prof Daya Reddy
Vice-President	Prof Iqbal Parker
Vice-President	Prof Brenda Wingfield
General Secretary	Prof Himla Soodyall
Treasurer	Prof Sunil Maharaj

2016 – 2017

Title	Name
President	Prof Jonathan Jansen
Vice-President	Prof Barney Piyana
Vice-President	Prof Brenda Wingfield
General Secretary	Prof Himla Soodyall
Treasurer	Prof Eugene Cloete

Appendix B: ASSAf Science-in-Society Gold Medal Award

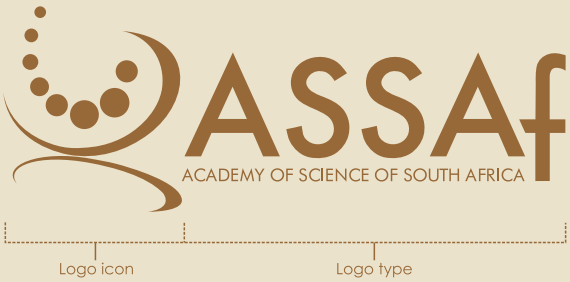
Year	Recipient	Field of Research	Institution
2003	Malegapuru Makgoba	Life Sciences	UKZN
	Trevor Jenkins	Life Sciences	Wits
2004	Hoosen Coovadia	Life Sciences	UKZN
	Brian Warner	Physical Sciences	UCT
2005	George Ellis	Mathematical Science	UCT
	Thomas Bothwell	Life Sciences	Wits
2006	David Glasser	Physical Sciences	Wits
	Wally Marasas	Physical Sciences	MRC
2007	Piet S. Steyn	Physical Sciences	SU
	John Darrel Comins	Physical Sciences	Wits
2008	Mike Wingfield	Life Sciences	UP
	Michael Samways	Life Sciences	SU
2009	Paul van Helden	Life Sciences	SU
	Anna Coutsoudis	Life Sciences	UKZN

2010	Diane Hildebrandt	Physical Sciences	Wits
	Eugene Cloete	Life Sciences	SU
2011	Salim Abdool Karim	Life Sciences	UKZN
	Helen Rees	Life Sciences	Wits
	Jillian Adler	Education	Wits
2012	Kobus Eloff	Agricultural Sciences, Health/ Medical Sciences and Life Sciences	UP
2013	Olive Shisana	Health Sciences	HSRC
2014	Jonathan Jansen	Humanities	UFS
	Quarraisha Abdool Karim	Health/Medical Sciences	UKZN
2015	Anusuya Chinsamy-Turan	Earth Sciences and Life Sciences	UCT
2016	Brian van Wilgen	Life Sciences	SU

ASSAf Brand Logo

In 2008/09 ASSAf developed and adopted a revitalised brand to position and propel ASSAf towards the future. The new brand was to

- differentiate ASSAf
- confirm its leading position in its science community
- reflect its visionary mission
- reflect its local, regional & global value



The logo consists of two elements – the logo type and the logo icon. These combined elements form the heart of the ASSAf branding.

Applying scientific thinking in the service of society

Logo type: Stylised initials of the Academy with full description underneath.

Logo icon: Design element based on applied thinking and re-designing the basic structure of the nautilus shell – an organic life form that has been in existence for millions of years.

Logo icon explained: Circles – compartments of nautilus shell representing scientific fields. The nautilus shell spiral is a logarithmic spiral similar to other spirals such as the golden mean or phi spiral, but with slightly different proportions. The spiral of the chambered nautilus, as well as other logarithmic spirals can be found throughout the human body and nature.