# Workshop Proceedings Report

# Role of Science Academies in the National System of Innovation

## Banqueting Hall, Royal Swazi Sun, Ezulwini, Swaziland

## Wednesday, 21 June 2017

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Mauritius Academy of Science and Technology

SADC Science, Technology and Innovation Desk

Tanzania Academy of Sciences

Zambia Academy of Sciences

Zimbabwe Academy of Science

**Acronyms and Abbreviations**

| | |
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| AAS | African Academy of Sciences |
| AMASA | Annual Meeting of African Science Academies |
| ASM | Academy of Sciences of Mozambique |
| ASSAf | Academy of Science of South Africa |
| AU | African Union |
| BAS | Botswana Academy of Sciences |
| DST | Department of Science & Technology |
| EAC | East African Community |
| ECOWAS | Economic Community of West African States |
| GMO | Genetically Modified Organisms |
| HE | Higher education |
| IAP | InterAcademy Panel |
| IAMP | InterAcademy Medical Panel |
| ICT | Information, Communication and Technology |
| NASAC | Network of African Science Academies |
| NDP | National Development Plan |
| NEPAD | New Partnership for Africa's Development |
| NIS | National Innovation System |
| NSI | National System of Innovation |
| OWSD | Organisation for Women in Science for the Developing World |
| PAP | Pan-African Parliament |
| R&D | Research and development |
| SA | South Africa |
| SADC | South African Development Community |
| SARIMA | Southern African Research and Innovation Management Association |
| SAYAS | South African Young Academy of Science |
| SDG | Sustainable Development Goal |
| SFSA | Science Forum SA |
| S&T | Science and technology |

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|---|---|
| STI | Science, technology and innovation |
| TAAS | Tanzania Academy of Sciences |
| TB | Tuberculosis |
| TWAS | The World Academy of Science |
| VE | Vocational education |
| ZaAS | Zambia Academy of Sciences |
| ZAS | Zimbabwe Academy of Sciences |

1. **Welcome (Mr Bhekithemba Victor Gama, Acting Principal Secretary, Ministry of Information, Communication and Technology, Swaziland)**

Mr Stanley Maphosa, one of the programme co-directors for the meeting, opened the workshop and introduced his programme co-director, Mrs Jackie Olang-Kado who welcomed all to the workshop, which would look at the role of science academies in the National System of Innovation (NSI). She advised that the programme had been altered slightly and introduced Mr Bhekithemba Victor Gama, acting principal secretary of the Ministry of Information, Communication & Technology, Swaziland.

Mr Gama recognised the Southern African Development Community (SADC) secretariat, government senior officials, private sector representatives, programme directors, academies of science, representatives from universities and the many other people who had worked towards making the workshop a success. He welcomed all to the workshop on behalf of the Government of Swaziland, and particularly his Ministry and described the workshop as the first historical workshop on the role of science academies to be held in Swaziland. He thanked the Academy of Science of South Africa (ASSAf) and his Ministry for partnering in organising and hosting the workshop, as well as all other partners, including the various science academies who were participating.

Mr Gama stated that we live in an era marked by changes and challenges, with increasing global competition and continuous change in the structure of society and the economy. We are also confronted with the effect of the economic crisis on government budgets, with Swaziland being a good example in this regard. The SADC region, as a whole, is faced with the question of how to get countries together to improve the standard of living for future generations. SADC is convinced that one answer is a NSI that will create long-term and sustainable employment. The concept of a NSI has been gaining momentum and is now widely used in academic and policy development circles to study various matters relating to countries. The NSI is a network of institutes that link to each other, thus stimulating interaction between organisations to promote new innovations and practices. The many actors involved include science academies, public research and development (R&D) organisations, financial institutions, technical support agencies, policymaking bodies and government. Understanding the linkages between the actors helps to improve the interaction and is a process that is crucial to improving the economic performance of countries. Mr Gama stated that he was impressed that the attendance list showed that all the roleplayers were represented at the workshop.

Mr Gama remarked that a journal article that appeared in 2009 included a commentary on the existing situation in countries, including Swaziland and Angola. For example it indicated that, they had no science, technology and innovation (STI) policy institutions, university collaboration was non-existent, the private sector was small and did not participate in research and development (R&D). However, Swaziland had surprised both itself and its counterparts and has been doing a lot for its NSI in a short time. This has been supported by the country's political will and vision to strengthen her ties with other countries and to witness change. The King of Swaziland has declared that STI is crucial in a developing

country. To that effect, Swaziland is reviewing its STI policy and intends to turn it into reality by creating a knowledge-based country. The country is establishing a national system of innovation for S&T and it is at an advanced state. In addition, research had been conducted with the assistance of the New Partnership for Africa's Development (NEPAD); sensitisation workshops have been run with the Southern African Research and Innovation Management Association (SARIMA) and other partners; and there is now a department of STI under the Ministry of Information, Communication and Technology (ICT). Previously, the Swaziland government representatives attended meetings with little knowledge regarding this subject, but now they are better informed and working towards meeting the King's vision. The King has pioneered industrial parks that will provide the fuel to drive the country to a higher level of industrialisation. Another effort to strengthen the country's NSI was initiating the process of establishing a national academy of science. Science advice can make a significant contribution to R&D in Africa. This workshop is then a welcome start to strengthening the country's NSI and institutional development initiatives. The country is paying increasing attention to science and innovation and agrees that it is important to draw on regional partnerships in order to succeed.

Mr Gama said that the workshop was realised largely due to the efforts of ASSAf and the SADC STI Desk and expressed thanks. He stated that many countries still have to determine the precise details of the advisory board, but there was a strong preference for building institutional capacity for advice. He hoped that the workshop would provide suggestions on how Swaziland could become the ninth country to establish a science academy. He also stated that members of science academies comprise both senior scientists and young scientists in universities, the private sector, government, think tanks, and civil society and that Swaziland is looking forward to starting the process of establishing an academy that encompasses all these facets.

In closing, Mr Gama stated that ASSAf does well at building regional and international friendships in science and has been doing so for two decades. The workshop was one way of assisting with the establishment of science academies in the SADC region. Swaziland embraced the opportunity with both hands and congratulated ASSAf for playing a strong advisory role over the last ten years. Swaziland has learnt from the evidence-based reports that ASSAf has produced that have addressed topics such as GMOs in Africa, drug-resistant TB, strategies for low-carbon cities, among others. He thanked ASSAf for the workshop and said that Swaziland was excited to join the rest of SADC science academies.

Mr Maphosa thanked Mr Gama for his address and noted that the welcome and kind words were appreciated and indicated that ASSAf had been working closely with Dr Maseko from Swaziland and expressed thanks for connecting the people involved in the meeting.

**See Annexure A for a copy of the programme**

## 2. Opening Remarks (Ms Anneline Morgan, SADC Science, Technology and Innovation Desk)

Ms Morgan, from the SADC STI Desk delivered the opening remarks. She reported that some SADC senior officials are in Maseru and would arrive the following day for the Ministerial Meeting. Thus, it was important to use the workshop opportunity to raise the profile of science academies as all SADC members would be attending. She reported that an item in this regard would be tabled at the Ministers Meeting, as there is a need for science academies to be established in the region and be supported in member states to perform their duties that are critical to the science and innovation system. She also mentioned that the workshop had been made possible by NASAC, ASSAf and the Government of Swaziland. She reported that science academies had received overwhelming support during a meeting of senior officials that was held the previous day where Professor Roseanne Diab of ASSAf had made a presentation. In closing, she wished everyone a morning of fruitful deliberations.

## 3. The Network of African Science Academies (NASAC) and the Role of Academies in Africa (Mrs Jackie Olang-Kado, Executive Director, NASAC)

Mr Maphosa introduced the Network of African Science Academies (NASAC) and stated that they were the primary funders of the workshop through their capacity building grant scheme. The funding had been secured by ASSAf after it had responded to NASAC's call for capacity building initiatives in Africa, especially those that target policymakers. ASSAf had responded on behalf of its SADC partners, which included the academies in Mozambique, Zambia, Tanzania and Mauritius who had endorsed the proposal. He introduced Mrs Jackie Olang-Kado, the Executive Director of NASAC.

Mrs Olang-Kado stated that NASAC is a network of science academies that was established in 2001, with a mission to ensure that African science academies work together and to assist countries that do not have science academies to establish one. There are currently 23 national science academies and new science academies are being recruited, including Burundi which has set up an academy and will soon become a member of NASAC. ASSAf has been NASAC's greatest champion and motivator of other countries. Members of NASAC are mostly from sub-Saharan countries and because a continental movement is desired, more effort is being made to initiate academies in the northern African region. The 24th science academy is the African Academy of Sciences (AAS) which accepts individual scientists from the continent as members. The voice of the network heard on the continent must be 'one voice' and thus the network has been mandated to strengthen existing member academies and the strong members must pull up the weaker ones to enhance the academies' joint strength. In cases where academies are really just a government department, this must be changed.

Scientists and policymakers have to work together, to ensure collaboration and alignment regarding policy. During proceedings of the SADC senior officials meeting which was held the previous day, attendees heard the complaints about graduates being produced who cannot be absorbed into S&T in countries. S&T research institutions must align their research agenda with the policy agenda so that they produce candidates who would be useful in

policymaking. If scientists pursue careers in policymaking, this would give direction to research being done. Science should not forget society and the arts, which are required to ensure an economically developed nation. Partnerships must be established and investment should not just be made in people but also in institutions that outlive people. Governments should coordinate action and work with local communities. Research institutes must interact with policymakers to ensure government invests in enterprises and must include non-state actors, as all players should have a place and platform to exchange ideas and assist a nation to prosper. Science academies must create space for a panel of experts to come together and talk about topics that are pertinent to the continent as this ensures publicity for studies that have been conducted. When what is being done in science in a country is known, one can translate the science findings and make them relevant to the public, inclusive of all sectors.

Outputs of science academies include policymakers' booklets and NASAC has produced four booklets that are easy to read, attractive and stimulate a need to know what science is about because it is explained in a way that non-scientists can understand. The topics are pertinent issues selected by NASAC using a process of consultation. There is a focus on women for science, as science academies are dominated by men. There is a need to recognise female scientists and young scientists and have them participate in working groups and not have a situation in which the academies are predominantly senior males. Academies are not exclusive clubs and women and younger scientists are required. Role models for young scientists need to be created by ensuring they know what is being done. It is also important to encourage young girls, who are generally excluded to participate in science at the higher levels. How science is taught determines if girls proceed with science, so there is a need to support a review of the curricula at primary school level, in order to reach them when they are young. There is a need to use local materials and ensure a sustainable model.

Researchers need to note the reality of the continent in which they are living and need to relate to global changes, e.g. creating sustainable energy, etc. A well-rounded scientist will be able to integrate all of this and this is what is required. There are opportunities for young scientists to receive funding for research studies. NASAC has provided capacity building grants (90 000 Euros) that were paid for two years to build sustainability. In 2016, the focus was on the nexus of health, energy and disaster management within the framework of cities. Science must relate to ongoing local and global issues and young scientists need to interact more with senior scientists who can act as role models. Recommendations to support policymaking are required and the involvement of both the public and private sector is key.

ASSAf can take the lead in SADC in terms of collaboration and NASAC can facilitate this by providing role models and adequate funding to ensure that at least the first meeting happens. It is critical to know and spread the word about the value of science academies. However, one size does not fit all and thus what is happening for example in Morocco is not the same as what is happening in Kenya. Therefore, joint projects and initiatives will provide value addition and promote centres of excellence in science. This is important as resources are limited and they must be used wisely for maximum effect.

What good is an academy if you do not know how to relate to it? We need to know how to relate to an academy and it is also important for scientists to relate to the reality on the ground and to communicate through non-standard media, e.g. social media. The support of all role players and academies is required to ensure sustainability, as the academies have to outlive the scientists.

A regional perspective is required as all academies need to contribute to the development of the continent. This is important, as it is how policymakers get to know what the region is thinking with regards to science and then platforms are created for policy dialogues to happen. A report serves no purpose if it just gathers dust on a shelf in an academy; it must be publicised and communicated in a language that non-scientists can understand. Academies need to engage with each other as institutes aiming to contribute to the economic development of a country and the entire continent. Scientists must be heard internationally, and it is important that the African voice is heard from the point of view of a consolidated forum, which articulates African issues.

Mrs Olang-Kado concluded that it was an honour to be associated with academies, which provide mechanisms for scientists to be heard and to hear that the science they are doing is relevant and impactful.

**See Appendix B for a copy of the presentation**

## 4. Overview of the Academy of Science of South Africa –ASSAf (Mr Stanley Maphosa, Liaison Manager, ASSAf)

Mr Maphosa stated that ASSAf was established through an act of Parliament and in response to the need for a science academy at the dawn of democracy. The ASSAf Act (*No 67 of 2001*) empowers the Academy to be a representative of South Africa at international level, e.g. NASAC. ASSAf provides scientific advice to government and has done so for the past 20 years, using studies and evidence-based advice on challenges affecting SA, such as HIV and AIDS.

In the SADC region, it is tasked with leading science academies and has assisted Botswana in establishing and academy and is also in discussion with Namibia to create one.

The ASSAf secretariat through its various programmes, conducts work in the SADC region, continentally and overseas. A number of recent activities that ASSAf has undertaken include:

- In 2016, ASSAf took ten South African young scientists to the Nobel Laureates meeting in Lindau. This year, ASSAf is again taking ten young South African scientists to the meeting.
- ASSAf assisted the Pan-African Parliament (PAP) to prepare a resolution on science academies and which was subsequently passed.
- ASSAf hosts The World Academy of Sciences Regional Office of sub-Saharan Africa (TWAS-ROSSA).
- In 2016, ASSAf hosted the 12th Annual Meeting of Science Academies (AMASA) and in 2017 the meeting will be held in Nigeria.

- ASSAf assisted the Zimbabwe academy to mobilise their scientists in South Africa in order to discuss ways in which they could assist their science system back at home.
- ASSAf hosts the South African National Chapter of the Organisation for Women Scientists in the Developing World (OWSD) and promotes fellowships for studies for women.
- ASSAf hosts the South African Young Academy of Science (SAYAS).

The Science Forum South Africa (SFSA) will be held in December 2017 and all stakeholders are invited.

ASSAf is looking for means and ways to penetrate other government departments within South Africa, given that the act states that ASSAf advises government. Also, additional funding is required for more activities. Operational funding is available from Parliament through the Department of Science and Technology (DST). ASSAf sees achieving critical mass of science academies in the SADC region as an opportunity, not a challenge. ASSAf is available and would welcome further engagement with stakeholders.

**See Appendix C for a copy of the presentation**

## 5. Role of Strategic Collaboration in Strengthening the NSI (Dr Gatama Gichini, Education Attaché, Kenya High Commission, South Africa)

The National System of Innovation and the National Innovation System (NIS) mean the same thing, whether at the local, country, SADC or continental level. The key word is 'innovation', which sometimes leads to conflict when it is said there is no innovation in the social sciences. However, the definition of innovation means all areas are covered – both the natural sciences and the social sciences: all are innovative and all contribute to a NIS.

A well-functioning innovation system ensures the linkages between universities and industry, and all other actors are in place, e.g. higher education system, framework conditions, infrastructure, funding, knowledge exchange, access to government assets, etc. In the new literature, there is also information innovation – the reality on the ground – and all of these are actors. The critical lesson is that no-one is superior and we all need to negotiate and liaise with one another; all actors in the NSI need to differentiate between competition and competitiveness. Natural scientists need to work with social scientists.

**See Appendix D for a copy of the presentation**

### 5.1. Questions, Comments and Discussion

Question/Comment:

I am interested in the Kenyan innovation system. How do you ensure industry and universities work together to produce reasonable innovation products for the country?

Dr Gichini:
On a needs basis. Societal challenges and scientists need to make money through solving societal challenges, e.g. a platform to inform farmers where the market is, even for the informal sector.

Question/Comment:
My point is to check with Kenya on what platform do you have to ensure results from academic institutes and research institutes have an impact on decision-making processes and implementation?

Dr Gichini:
We need to ensure that knowledge generated by universities and research institutes informs policy. Not long ago, universities started to focus their funding of scientists by creating categories, e.g. projects go to a principle investigator and it is broken down into work packages that are given to Masters and PhD students. The scientists are expected to provide a policy brief. Projects are tied to the National Development Plan (NDP) so, when there is a call, it is very specific.

## 6. Overview of the Zambia Academy of Sciences (ZaAS) (Prof Imasiku Nyambe, Fellow, ZaAS)

Prof Nyambe stated that the ZaAS is part of the Ministry of Science, Technology and Vocational Training and this happened when the country moved from a one-party state to a multi-party system. The ministry was created because it was recognised that S&T is fundamental in building a nation and it was needed for internal and external trade or the country would be left behind. However, an S&T policy was missing and which was needed to guide the ministry in fulfilling its role and thus, in 1996, the policy was developed and this is the year that the idea of forming an academy was born. Finally, in 2005, the academy was established but there were challenges since few activities were being conducted. It is only now that there is a strategic plan for 2016-2019. There were ten years of no progress, but now there is a plan, a vision and a mission. There are varied discussions regarding how to establish academies, e.g. through an association, an act of Parliament, etc. In Zambia, it is preferred that the academy be formalised through an act of Parliament as this will ensure access to resources, e.g. funding. ZaAS hopes to have an enhanced academic governance structure and other elements in place by 2019, after which the academy will be able to mobilise resources.

In terms of activities, ZaAS with support from NASAC, has published a booklet, and received support from ASSAf in other areas and have participated in many workshops, including this one. The activities of the academy need to be at the centre of the 17 Sustainable Development Goals (SDGs). If ZaAS can do all of this, it will be the best in the region.

**See Appendix E for a copy of the presentation**

## 7. Overview of the Tanzania Academy of Sciences (TAAS) (Prof Keto Mshigeni, EXCO Member, TAAS)

Prof Mshigeni clarified that Tanzania is a member of both the East African Community (EAC) and SADC. He stated that the goals of TAAS are science-based and that accountability and teamwork are important aspects. There is participation in scientific meetings and TAAS is also an active participant in the InterAcademy Partnership (IAP), and IAP for Health, etc. TAAS, with the support of NASAC, produced a publication titled *Lighting a Fire* a few years ago, it contains 31 stories of eminent Tanzanian scientists. As in the case of Zambia, TAAS is still negotiating with the Tanzanian government to ensure an act of Parliament is enacted. This process is approaching completion. A number of publications have been produced, including newsletters that detail some of the innovations. Policy advice documents have been made available and are engaging and influencing the government and decision-makers.

Prof Mshigeni presented to the leader of the delegation from Swaziland a copy the various publications listed in his power-point presentation.

**See Appendix F for a copy of the presentation**

## 8. Overview of the Academy of Sciences of Mozambique (ASM) (Prof Geraldo Nhumaio, Fellow, ASM)

Prof Nhumaio stated that there are currently 100 members and the plenary congregates the members.

ASM has organised and attended a number of conferences and collaborated with ASSAf on a publication titled *Turning on Science*. Since 2013, Mozambique has started to become a key player in the field of extracting natural resources. ASM also has links to a number of other countries, including Italy, Portugal, etc.

ASM encountered challenges when its Ministry of S&T was integrated with the Ministry of Higher Education (HE) and Vocational Education (VE) which involved moving staff and offices, appointing new staff, etc., resulted in difficulties. Funding remains a problem for the academy since there are economic hardships not only in Mozambique, but also worldwide. The government understands the challenges that face ASM and attendance at this workshop was not only for the benefit of the Academy, but also to ensure understanding by the government of the role it can play and where it should be placed. Incentives have been discussed for some time and the situation needs to be understood. ASM has supporting staff and a board: the former are paid as full-time employees of ASM, but board members work on a voluntary basis. This is a prestigious activity and incentives should not be insignificant. The severity of the situation was seen in 2014, when the first board ended its term of office and there was no-one available to become the President. The current President has now been elected to the Association of African Universities, which means elections are required. Young scientists remain under-represented in the academy.

**See Appendix G for a copy of the presentation**

## 9. Overview of the Botswana Academy of Sciences (BAS) (Prof Motsoptse Modisi, President, BAS)

Prof Modisi noted that much had been said about the status of academies and although the BAS situation is similar he would focus on aspects that are unique to BAS since it is one of the younger academies. At the official launch of BAS, it was recognised by the government at the highest level as being a necessity and it was attended by the Minister responsible for S&T. The objectives of BAS provide a good overview of what the academy is about, which is principally interaction of Botswanan scientists with the international science community and the neighbouring community and also advising government on science matters and how these relates to the social and economic development of the country.

BAS is about promoting awareness of science amongst the public and obtaining their support and it is also about advising on science education – which is an important part of promoting science – and about the relevance of the science that is conducted. It is important to conduct blue sky science, but it must also be relevant to the challenges of science and other global challenges.

The focus of BAS is on the STEM (science, technology, engineering, mathematics) disciplines, as they relate to promoting solutions to social problems. The humanities have not been excluded and they are expected to be an integral part of the science academy, so that they can assist in both the social and economic development of the country. BAS wishes to be part of the global community and what is done will be aligned to global goals, as spelt out in the SDGs.

BAS will also align to the AU Agenda 2063 and National Vision 2036, which recognise the global goals and even though they do not specify S&T, it is known that S&T is a common denominator that is expressed as a social benefit that society will acquire. When the goals are unpacked, they illustrate that STI is an integral part of achieving the goals. Government ministries have been reconstituted to address these global challenges and climate change is near the top of the lists. It is also important to note the requirement for developing proper strategies and policies that are based on credible reports, data and evidence.

BAS is still a young academy, as it was only launched in 2015. In 2016, the leadership worked on getting the board in place and building structural systems, nominating and electing fellows of the academy and engagement with networks – particularly the African Academy of Sciences. In 2016, BAS was recognised as the newest academy on the African continent. BAS realises that it needs to combine the wisdom of S&T achievers with the energy of young and early-career scientists and mid-career scientists. These are people with a lot of energy, who can bring dynamism and a variety of activities to the academy and our membership categories recognise this. BAS has a membership category for achievers who have demonstrated their achievements and we are working on expanding the fellows. The induction of the fellows coincided with the academy meeting held in June 2016, which was graced by the President of Botswana and he shared words of support and encouragement in welcoming the arrival of the academy.

BAS has participated in NASAC activities, including the communication event of a climate change policymakers' booklet; sent editors to the Editors' Forum organised by ASSAf; and attended the 2017 Commonwealth Conference held in Singapore. The intention of BAS is to

have structures representing various disciplines and a strategic plan must be prepared. Reports should be produced as a result of regional and international networking and engagement.

**See Appendix H for a copy of the presentation**

## 10. Overview of the Zimbabwe Academy of Sciences (ZAS) (Prof Charles Nhachi, Vice President, ZAS)

Prof Nhachi referred to Mr Maphosa's comment about Tanzania being a member of SADC and explained that this is a historical matter. It goes back to when the late former President Julius Nyerere was Chair of the frontline states and assisted in liberating a number of southern African countries which then converged into SADC and Tanzania was invited to become a member, as a gesture of respect.

Prof Nhachi stated that ZAS was formed from the Zimbabwe Research Council in the President's Office. The Research Council has a charter and once we have an act of Parliament then ZAS will receive annual funding from government, which will be most helpful. ZAS currently has 250 members and new members apply through the colleges. Any member can become a fellow and everyone wants membership and the title FZAS. Honorary fellows include past-presidents and the first President of ZAS is a well-known world scientist, known for many discoveries. Currently, there is some debate as to whether heads of state should be honorary fellows. Three people are currently able to use HFZAS. ZAS has no secretariat due to funding challenges but there is a secretary who can assist. The strategic objectives of ZAS are similar to those of other academies. ZAS started the compilation of a journal and there is a newsletter which is published bi-annually and it has worked well for the academy and generated publicity. Academies are moving into the area of journals and publications, but it is not easy to come up with a journal – although it is not impossible. So, academies need to think carefully about this.

ZAS is faced with various challenges, some of which are peculiar to Zimbabwe. For instance, there is diaspora scatter with four million people outside the country having left in the last ten years, whereas the population is 54 million inside the country. Those who have left are skilled and qualified people and perhaps two million of these are in South Africa. The problem of limited resources has been experienced for some time and is chronic. Zimbabwe is one of the few countries to use the US$, the downside of which is that many people from neighbouring countries come for dollars and take them back to their home country to change them there, particularly Zambians. There is an under-staffing problem in the country because of migration. The membership commitment of the academy is poor and interest and commitment need to be stimulated.

ASSAf has been a big help to ZAS for the last ten years: they have taken ZAS by the hand, funded some activities and workshops, organised the meeting last year of Zimbabwe scientists in the diaspora to try to help ZAS, etc. Zambia, Malawi and Zimbabwe have a number of programmes that they run together, especially medical programmes. The three countries have been tied together economically for a long time.

SADC has been talking a lot about industrialisation in the region, but all countries in the world that are industrialised have a strong scientific base and funding is provided. According to SADC, 1% of the budget should go to science education, but in sub-Saharan countries, only Botswana and South Africa give that money to education. Without funding, industrialisation will just be a dream. Linked to this is the fact that the economic contribution of Africa to the global market is 2%. Serious thought needs to be given to this and the youth should be encouraged to get involved in science and the academies must encourage this.

**See Appendix I for a copy of the presentation**

## 11. Questions, Comments and Discussion – Session 2

Mr Maphosa thanked all the speakers for their input, which he said showed that the academies are doing a lot of work with minimal resources.

Question/Comment:
Much work is possible through collaboration and partnerships and we have seen how important partnering is, so all must forge partnerships in the region and ensure cooperation and regional participation. ASSAf and NASAC want to continue policy dialogues for purposes of awareness, sharing of knowledge and experiences especially where people are unaware of the role of academies of science. It is strategically important that these dialogue happen on the fringes of ministerial meetings, such as with this workshop, as this lifts the event, the profile and the role of the academies. Social media is a powerful tool that needs to be used and for instance, ASSAf tweeted about this workshop. One long-term objective is to have a network of science academies in the SADC region so as to provide a platform to act as a think tank and policy advisor. The SADC secretariat is also looking at setting up think tanks, which are lacking in the region, to provide scientific evidence and input to policymaking. There is also a need to form a consortium to lead on various topics and we need to see this happen as soon as possible.

Question/Comment:
How are the various science academies aligning with e-governance, as SADC is lagging behind European countries?

Response from BAS:
I didn't include any efforts made by government in promoting S&T, but there is a major effort in Botswana to make government accessible to the population through e-governance. This means that online services and digital technology are used. The Kenya presentation mentioned establishing fibre optics and this is one thing that is happening in Botswana. The science academy will be part of that effort of e-governance. But these are capital-intensive infrastructure developments that rarely happen in Botswana, Kenya and elsewhere.

Question/Comment:
I like the activities being done and the policy briefs and advice given to government but I didn't see the links with other scientists who are not part of the academy as they prepare advice and policy briefs. So, are you getting information only from the academy members or also from scientists outside the academy and even outside the country? And if so, how are they doing it?

Response from NASAC:
We are trying to address the issue of links with scientists outside the academies. When we make a call for experts on any topic, we ask people to think about expertise and not membership, so we go beyond membership of academies if needed and nominate experts who are not members. Some countries do not have national science academies, but there is a regional academy, i.e. AAS which is leveraged to nominate experts. The link with non-members is important, as this is how membership grows and where young scientists come from. Also, institutions where senior and young people operate may not be the same, so it is important to bring in experts in the field and ensure that advice to countries comes not only from academy membership.

Response from ZaAS:
In Zambia, members are not only drawn from universities, but also from fellows who can contribute to innovation, some are in government and others in the private sector. Information is shared and Zambia also has fibre optics that connects all universities and some government institutes. If SADC countries have to do something, it's high time that we came together and do what we do best; let us take some of these things seriously, as this part of Africa is dependent on us. Go out and get what you can and do it for the betterment of your country.
Response from ZAS:
We try to make the academy a collator of data in the country, so that other countries and institutions know where to obtain information. Because of attendance of conferences, the academy knows who the experts are. ZAS uses its influence to introduce science in schools to start encouraging people at a young age and get them acquainted with S&T.

Response from Mozambique:
Government has committed itself through the academy and the past two presidents of the country understood this would exist for scientific purposes. The President of ASM was elected and then a board of directors. The umbrella ministry ensured payment for support staff and offices. This showed the commitment of government. The current minister in charge is in the process of understanding what the academy is and what its duties should be in order to fully integrate it into his ministry. So, he has to integrate and put things together; thereafter we will have proactive actions. Additionally, without scientists there can be no academies and no knowledge economy and so we need to look at retaining scientists and addressing the problems that make them seek greener pastures. We must also look at things at the regional level, which is important in ensuring we achieve what we want to as a regional bloc.

## 4) Way Forward, Closure and Thanks

Mr Maphosa remarked that the SADC secretariat representative had already started the discussion on the way forward, including the fact that academies are already doing a lot and in some cases with little or minimal support from their governments with the exception of South Africa. There is also a lot of cooperation and this is appreciated and must be taken further to create a network of academies in SADC that is aligned to the regional strategy and it must lift the profiles of academies in future engagements.

The SADC secretariat added the following points on the way forward:

- Ideas have been provided that the academies need to digest and take forward, including on policy and dialogue, among others.
- SA is the incoming Chair of SADC and will take over from Swaziland.
- At next year's ministerial event there will be another round-table discussion and academies should prepare key papers on industrialisation and must ensure a policy debate with a minister to chair the event, as a side event.
- When hosting the SADC summit in August 2017, there will be the first industrialisation week and next month there is a whole week of events in SA. The captains of industry must be brought in to participate and that private sector's involvement and support for S&T is needed thus this cannot be restricted to government and academia.
- As part of the summit there is also a public lecture; last year in Swaziland, the former president of Tanzania spoke. SADC secretariat is preparing for a summit in South Africa and academies need to suggest a speaker; and that Ms Graca Machel might be approached, but key figures and scientists need to be proposed.
- These are just a few ideas to continue with and partner on and we need to take these matters further.

Mrs Olang-Kado added that there is a movement to support and increase membership of science academies and countries need to move as a bloc to realise their plans and retain scientists in regions through multilateral or bilateral agreements. NASAC operates as an Africa-wide body and what it does with the SADC, it also does with the EAC, and the Economic Community of West African States. It is important for academies to ensure that they are sustainable and so they have to be linked to government and the benefits must be mutual. However, academies must retain their independence in giving advice and must promote these qualities within the academies.

Mr Maphosa then advised that the workshop proceedings report would be shared with all participants. The report should be uploaded onto various websites and shared as the workshop is a joint meeting of stakeholders.

Mr Maphosa acknowledged that ASSAf was the facilitator of the workshop and that NASAC, IAP, SADC, and the government of Swaziland were partners and thanked them for their contributions. He thanked all representatives, participants, SADC, the Government of Swaziland, Ministry of ICT, all academics, NASAC and all the science academy representatives.

Dr Rejoice Maseko from the Swaziland Ministry of Information, Communication and Technology thanked everyone for their participation and stated that the workshop was a dream come true for the country. It had started as an informal discussion a long time ago and now it had happened. She also added that the current status of Swaziland being classified as having a weak system of innovation would change soon and the country would be number nine in the list of academies of science. Swaziland means business, as His Majesty the King of Swaziland is serious about promoting STI. She added that Swaziland had invited some stakeholders to look at the progress made in STI. Swaziland has a Royal Industrial Park and is strengthening its systems.

Dr Maseko thanked ASSAf and SADC for the opportunity provided to Swaziland, as the programmes were tight and it was initially thought it would be impossible to stage the workshop. She also thanked all other stakeholders and participants for their support and for attendance of the meetings.

**Annexure A: Workshop Programme**

**ROLE OF SCIENCE ACADEMIES IN THE NATIONAL SYSTEM OF INNOVATION**

**BANQUETING HALL, ROYAL SWAZI SPA, EZULWINI, SWAZILAND**

**WEDNESDAY, 21 JUNE 2017**

**PROGRAMME**

| | | |
|---|---|---|
| **08:00-09:00** | **Arrival and Registration** | |
| 09:00-09:15 | **Welcome**<br>Mr Bhekithemba Victor Gama, Acting Principal Secretary, Ministry of Information, Communication and Technology, Swaziland | Programme Directors:<br>Mr Stanley Maphosa<br>Liaison Manager<br>ASSAf<br><br>Mrs Jackie Olang-Kado<br>Executive Director<br>NASAC |
| 09:15 – 09:30 | **Opening Remarks**<br>Ms Anneline Morgan, SADC Science, Technology and Innovation Desk | |
| 09:30 – 09:45 | **Network of African Science Academies (NASAC) and the role of Academies in Africa**<br>Mrs Jackie Olang-Kado, Executive Director, NASAC | |
| 09:45 – 10:00 | **Overview of the Academy of Science of South Africa (ASSAf)**<br>Mr Stanley Maphosa, Liaison Manager, ASSAf | |
| 10:15 – 10:15 | **Overview of the Zimbabwe Academy of Sciences (ZAS)**<br>Prof Charles Nhachi, Vice President, ZAS | |
| **10:15 – 10:45** | **Tea Break** | |
| 10:45 – 11:00 | **Overview of the Zambia Academy of Sciences (ZaAS)**<br>Prof Imasiku Nyambe, Fellow, ZaAS | |
| 11:00 – 11:15 | **Overview of the Tanzania Academy of Sciences (TAS)**<br>Prof Keto Mshigeni, EXCO Member, TAS | |
| 11:15 – 11:30 | **Overview of the Academy of Sciences of Mozambique (ASM)**<br>Prof Geraldo Nhumaio, Fellow, ASM | |
| 11:30 – 11:45 | **Overview of the Botswana Academy of Sciences (BAS)**<br>Prof Motsoptse Modisi, President, BAS | |
| 11:45 – 12:00 | **Role of collaboration in strengthening the National System of Innovation**<br>Dr Gatama Gichini, Education Attaché, Kenya High Commission, South Africa | |
| **12:00-12:50** | **Discussions, reflections and recommendations for ministers meeting** | |
| 12:50 – 13:00 | **Way forward, vote of thanks and closure**<br>Mr Stanley Maphosa, Liaison Manager, ASSAf | |
| **13:00 – 14:00** | **Lunch** | |
| | | |

**BIOGRAPHIES:**

**Mr. Bhekithemba Victor Gama**

Mr. Bhekithemba V. Gama is the Acting Principal Secretary for the Ministry of information, Communications and Technology (MoICT) in Swaziland. He holds a Master's Degree in Education (Mathematics) from the University of Bristol, United Kingdom, a Bachelor of Sciences (Majoring in Mathematics and Chemistry) from the University of Swaziland and an Advanced Diploma in Education from the University of Bristol, United Kingdom. He has been a Lecturer of Mathematics in various Institutions for 15 years. He has worked as an Inspector of Schools – Mathematics for 8 years in the Ministry of Education, Swaziland and he is currently the substantive Under Secretary of the Ministry of ICT where he is leading the Administration Team which includes seven Directors under the MoICT portfolio.

**Mrs Jackie Olang-Kado**

Mrs Olang-Kado is the Executive Director of the Network of African Science Academies (NASAC). NASAC, whose secretariat is based in Nairobi, Kenya, is a consortium of twenty-four science academies in Africa, with membership drawn from all spheres of science. Mrs Kado is a Masters of Arts graduate in Project Planning and Management (MA-PPM) from the University of Nairobi. She also holds a Bachelor of Education degree (BEd.) in Mathematics and Commerce, from the same university. Her specialization is project management for policy in science and she has over fifteen years' experience working with scientists in Africa. She is an astute proponent for home-grown solutions that will enable Africa realize its potential. Besides her role in NASAC, she also provides input to a number of African initiatives and also serves on the several regional and international Committees.

**Mr Stanley Maphosa**

Mr Maphosa is the Liaison Manager at the Academy of Science of South Africa (ASSAf). He leads the Liaison Programme of the academy that is responsible for strategic partnerships with global science networks, Overseas Collaborations, African Collaborations, Gender in Science, Technology and Innovation (GenderInSITE), as well as Young Scientist Liaison. The liaison team is also responsible for hosting the South Africa Chapter of the Organisation of Women in Science for the Developing World (OWSD), The World Academy of Sciences-Regional Office of sub-Saharan Africa (TWAS-ROSSA) and the International Council for Science Regional Office for Africa (ICSU ROA). Mr Maphosa previously worked for 12 years with World Vision International in South Africa and Southern Africa from grassroots to Senior Leadership level. Before that, he worked for 15 years as a school teacher, Journalism Lecturer and part time Radio Youth Programs Producer. He holds a Masters degree in Development Studies from the University of South Africa and a Postgraduate Diploma in Humanitarian Assistance from the Liverpool School of Tropical Medicine.

**Prof Charles Nhachi**

Charles Nhachi is a Professor of Clinical Pharmacology and Toxicology at the College of Health Sciences, University of Zimbabwe. He has also been an expert advisor in the department of Environment and Sustainable Development at the World Health Organisation office in Brazzaville. Prof Nhachi received his doctorate degree in Clinical Pharmacology and Toxicology from the University of London, Chelsea College and a Master of Science degree in Applied Advanced Toxicology from the University of Surrey in England.

**Prof Imasiku Anayawa Nyambe**
Imasiku Nyambe is a Professor of geology and Coordinator of the University of Zambia (UNZA) Integrated Water Resources Management (IWRM) Centre. He was formerly, Director of the Directorate of Research and Graduate Studies, responsible for research and postgraduate studies at the UNZA. He holds a PhD in Earth Sciences (sedimentology), an MSc in Geology (hydrogeology /sedimentology) from Canada and B. Min. Sciences (geology) from the University of Zambia. Prof Nyambe also previously worked in the copper mining industry in Zambia before joining the UNZA. He has over 25 years' experience as a geo-scientist undertaking research in the areas of geology, hydrogeology, environment and mining, IWRM, and basic Remote Sensing and GIS. His involvement in research on mining and the environment earned him an award from the Zambia Environmental Management Agency in 2012 and a National Science and Technology Council's Certificate of Achievement for the exceptional contribution to research and innovations award. On Public Service, Prof Nyambe is the Acting Chairperson of Zambia Water Partnership – the Zambian Chapter of the Global Water Partnership and the Chairperson for Zambia Water Forum and Exhibition. He has been the Secretary General of the Geological Society of Africa (2004-2008) and President of the Geological Society of Zambia (2000-2010).

**Prof Keto Mshigeni**
Prof Mshigeni is a Tanzanian who earned his PhD in Botanical Sciences from the University of Hawaii (Manoa campus) in 1974, and his BSc. degree from the University of East Africa (Dar es Salaam University College campus) in 1969. He is one of the Founding Fellows of the Tanzania Academy of Sciences (TAAS); Elected Fellow of the African Academy of Sciences (AAS), the World Academy of Sciences (TWAS), and the World Technology Network (WTN). Prof Mshigeni is the Immediate Past Vice Chancellor of Hubert Kairuki Memorial University in Tanzania, Immediate Past Vice President of TWAS (representing the Africa region); Immediate Past Secretary General of TAAS; and had previously also served as Professor of Botany and Founding Director of Postgraduate Studies at the University of Dar es Salaam, and Founding Pro-Vice Chancellor for Academic Affairs and Research at the University of Namibia (UNAM). Over the years he has won many honours, prizes, and awards.

**Prof Gerald Nhumaio**
Prof Nhumaio is a PhD holder from the Manchester Institute of Science and Technology, UK, obtained in 2000. He is Assistant Professor in the field of Thermal Power and Fluids Engineering at the Eduardo Mondlane University, Mozambique, where, while engaged in his academic career, he is a secretary of the Technological Section within the Academy of Science of Mozambique which is under the umbrella of the Ministry of Science, Technology and Higher and Vocational Education. Amongst his duties, he oversees research projects in Mozambique in the areas of hydro and solar thermal technology, and is responsible for post-graduate programs taking place in four Mozambican Public Institutions. Since 2006, he has been coordinating a Master of Science course on Sustainable Energy Engineering, in partnership with the Royal Institute of Technology, Sweden.

**Prof Motsoptse Phillip Modisi**
Prof Modisi is the President of the Botswana Academy of Sciences which is leading the initiative to consolidate the placement of science, technology engineering and mathematics (STEM) group of disciplines at the centre of a knowledge-based economy, through advocacy, advice, and coordination at national and international platforms. He is also the Acting Director in the Office of Research and Development at the University of Botswana. Previously, Prof Modisi managed the Economic Geology and Field Mapping Divisions of the Geological Survey and advised the Director on mineral exploration and mapping policy for national development planning. He also

monitored and administered prospecting licenses held by private sector prospecting companies exploring for precious stones (diamonds), semi-precious, metallic ore deposits, coal and industrial minerals inter alia. Prof Modisi holds a PhD in Geology and has over 40 years' experience in his field.

**Dr Gatama Gichini**

Dr Gatama is a Senior Assistant Director Research at the Ministry of Education, Republic of Kenya. Since 11th January 2016, Dr Gichini was posted at the Kenya High Commission in the Republic of South Africa as an Education Attaché. At the Kenya High Commission his responsibilities among others are promotion of Education, Science, Technology and Innovation bilateral relations between the Republics of Kenya, South Africa and countries of accreditation. Dr Gichini holds a PhD in Agricultural Entomology from Jomo Kenyatta University of Agriculture and Technology, Kenya. Prior to joining the Ministry of Education and Kenya High Commission, Pretoria, he worked for International Centre of Insect Physiology and Ecology (ICIPE) and Kenya Plant Inspectorate Services, Republic of Kenya, where his main duties were implementation of donor funded technical projects that focused on formulation, monitoring and evaluation of policies aimed at protecting Kenya's agriculture from pests and diseases. At the Ministry of Education his responsibilities were; liaising and working closely with national, regional and international organizations to develop education science and technology funding proposals; Review of the existing Education, Science, Technology and Innovation policies, agreements and collaborations with development partners; Development and Implementations of National Education, Science, Technology and Innovation Programmes and Medium-Term Expenditure Frameworks.

**PARTNERS:**

The hosting of this event has been made possible by the kind support from the following:
IAP-The InterAcademy Partnership
The Network of African Science Academies
The Government of Swaziland
SADC Science, Technology and Innovation Desk
Mauritius Academy of Science and Technology
Academy of Science of Mozambique
Tanzania Academy of Sciences
Zambia Academy of Sciences

## Appendix B: Presentation by NASAC

# NASAC AND THE ROLE OF SCIENCE ACADEMIES IN AFRICA

**JACKIE OLANG-KADO**
NASAC Secretariat, Nairobi-Kenya
Website: www.nasaconline.org
**Email:** jolang@nasaconline.org

*Role of Science Academies in the National System of Innovation*
**21 June 2017, Ezulwini, Swaziland**

## OUTLINE

- **Background information on NASAC**
  Who we are and what do we do?
- **Key Priorities of NASAC**
  Activities on various science-policy issues
- **Opportunities for Science Academies as NASAC-members**
  Regional and national perspectives

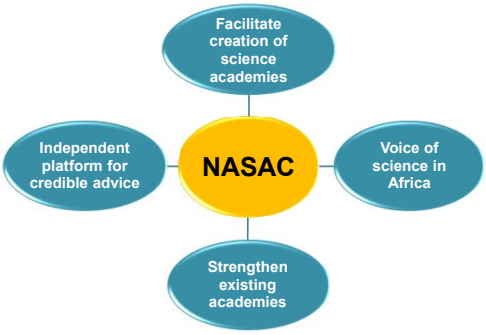
## NASAC: who we are

**NASAC and its Members**: Founded in Dec. 2001 as independent forum for African science academies to "***provide authoritative science advice for policy formulation towards development in Africa***"

| Member Academies | |
|---|---|
| Cameroon | Senegal |
| Ethiopia | Sudan |
| Ghana | South Africa |
| Kenya | Tanzania |
| Madagascar | Uganda |
| Morocco | Zambia |
| Mozambique | Zimbabwe |
| Nigeria | Mauritius |
| Benin | Togo |
| Burkina Faso | Congo Brazaville |
| AAS *(regional academy) and host of the Secretariat in Nairobi, Kenya* | |

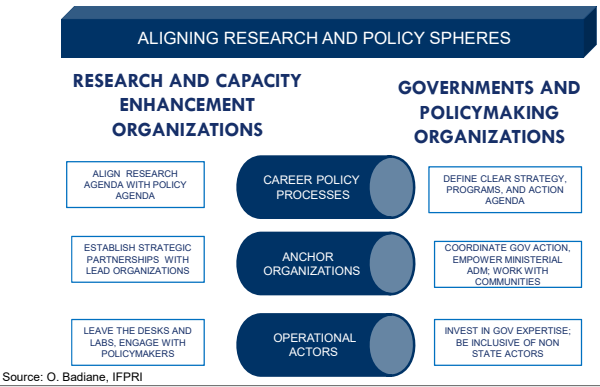
- 8 founding member-academies to current 24 (Algeria, Botswana, Cote d'Ivoire – 9Nov16)
- **Potential new members:**
  - Burundi
  - Egypt
  - Rwanda
  - Namibia

## NASAC: what we do




## Key Priorities of NASAC

## CREATING CONDITIONS FOR EVIDENCE-BASED POLICY PLANNING AND IMPLEMENTATION




Source: O. Badiane, IFPRI

## Science-Policy Dialogue Space

- Hold workshops for Panel of Experts on various topics to tackle pertinent issues
- Provide platforms for researchers, policymakers and NGO/CBOs to dialogue on issues/concerns
- Develop policymakers' booklets that translate the science into policy recommendations by scientists
- Enhance the visibility of existing scientific breakthroughs and showcase success stories by African scientists and institutions
- Maintain relevance of science to the public and private sectors

## NASAC's policymakers' booklets


## Women for Science (WfS) Program

- ***WfS WG - Convening forum for Women Scientists in Africa***: Aims to apply the gender-lens in science through shared experiences and priorities of academies
  - Building gender capacity and input of women into academies (involvement and recognition)
  - Networking, supporting and increasing the profile of women in science (visibility through publication)
  - Encouraging the gender mainstreaming of science curricula in education to encourage pursuit of science-careers by girls in schools (role-models)

## Science Education Program (SEP)

- ***SEP FP – Education and science curricula experts:*** Aims to exchange practical skills and technical knowledge on Inquiry Based Science Education (IBSE) for African schools
  - Support the review of science curriculum at primary school level
  - Training of trainers activities (learning and teaching of science)
  - Undertake IBSE survey in African Countries/NASAC members

## Leading Integrated Research in Africa 2030 Agenda (LIRA2030)

- Global environmental change
- Disaster risk reduction
- Urban health and human wellbeing
- Sustainable energy
  - ✓ Nexus between them
  - ✓ Through the lens of gender equity and poverty reduction

## Opportunities for Science Academies as NASAC-members

## The value-addition of Science Academies in STI in Africa

- ***Science-advise***: Recommendations to support public involvement and policymaking for science and society (public and private sectors)
- ***Networking***: Present an opportunity for the academies to interact with interested/relevant stakeholders on thematic areas (convening power)
- ***Recognition***: Provide a mechanism for honoring scientists and experts giving them a platform to be "heard" – making science relevant and impactful

## Roles of Science Academies within NASAC

- ***Honourific*** – recognize members' contributions and achievements providing a platform for interaction and sharing experiences (science for science)
- ***Programmatic*** – focus on delivery of activities that foster the popularization and relevance of STI in Africa (science for society)
- ***Advisory*** – providing merit-based advice that allows science to engage national policy and the public (science for policy)

## Relevance of joining the Network

- Inter- and Intra- networking among NASAC members and other relevant organizations
- Mobilize resources for joint initiatives for NASAC members to undertake in-country and sub/regional activities
- Inspire members to improve communication beyond their academies – contact with the media & society
- Appreciate interaction and consultation with relevant stakeholders (to secure collective buy-in)

## Improve National-Regional Context

- Promote realization of regional strategic agenda by regional and subregional bodies like the AU, UNECA, AfDB, RECs
- Disseminate policy advisory documents to African policy and decision makers in order to influence policy
- Ensure that science-policy dialogue takes place to inform economic development actions
- Contribute to international and global forums

## Counting on your support…

## Appendix C: Presentation by ASSAf

ASSAf

*Applying scientific thinking in the service of society*

# The role of Science Academies in the National Science Innovation

By Mr Stanley Maphosa
International Liaison Manager, ASSAf

## ASSAf Background

- Inaugurated in May 1996 in response to a need for an academy of science consonant to the dawn of democracy
- It adapted the name "science" to reflect a common way of enquiry rather than an aggregation of different disciplines
- Its members are selected on **academic excellence and significant contribution to society**

## ASSAf Mandate

ASSAf is mandated by an Act of Parliament- ASSAf Act Number 67 of 2001. The act came into force on the 15th of May 2002. It mandates ASSAf:

- To honour distinguished scholars in all fields of scientific enquiry (506 members currently)
- To generate evidence-based solutions to national and global challenges

## ASSAf Mandate

- ASSAf reports to the Department of Science and Technology- has a public entity status
- ASSAf also makes regular reports to parliament- Parliamentary Portfolio Committee for Science and Technology
- Recognized as the only official science academy to represent South Africa in the international community of science and elsewhere

## ASSAf Goals

- 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 & science education
- Promotion of national, regional and international linkages

## Alignment with Government Goals (National Development Plan 2030)

- 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
- Improvement of environmental assets and natural resources

## Governance

- **Council:** Elected Members, Advisors and One member seconded by the Minister of Science and Technology
- The current President is Professor Jonathan Jansen
- **Council sub Committees:** Audit and Risk, Human Resources and other subject specific committees
- **Secretariat:** with 34 members of full time staff led by the Executive Officer

## Programmes of the Academy


## Achievements: International

- ASSAf represents the Developing Countries in the **InterAcademy Partnership (IAP)** Executive Committee
- Serves also in the Executive Board of the IAP for Health
- Part of the Science 20 Countries (G20)
- Nominates young scientist for the BRICS Young Scientists Forum
- Nominating partner of the Lindau Nobel Laurates Meetings
- Instrumental to the formation of the International Network of Government Science Advisors (INGSA) African Chapter
- Serves in the **Network of African Science Academies (NASAC)** board ever since its formation in 2001
- Worked to influence Pan African Parliament (PAP)to pass a **resolution on Science Academies** in 2016

## Achievements: International

- Hosts and works with other International Organisations- The World Academy of Science Regional Office for sub-Saharan Africa (TWAS-ROSSA), the International Science Council Regional Office for Africa (ICSU-ROA) and is the southern Africa Focal point for Gender in science Technology and Engineering (GenderInSITE)
- ASSAf is the southern Africa Regional Academy as per the NASAC Strategy 2016-2020
- Assisted in the formation of the Botswana Academy of Sciences (BAS) and collaborates in some joint activities
- Has had discussions with Namibia on the formation of the academy
- Hosted Annual Meeting of African Science Academies (AMASA)12 in South Africa 2016

## Achievements: International

- Has bilateral agreements with Uganda, Nigeria, Mauritius and Benin. Working to bring in more especially those with country bilateral agreements with the DST
- Conducted a Zimbabwean Scientists in the Diaspora meeting in Sept 2016
- Conducted a Gender Mainstreaming and Monitoring Symposium in Botswana in partnership with the SADC-STI desk in April 2017. ASSAf has good working relationships with the SADC secretariat since 2015 and have done a number of meetings together.
- Conducted a Science Diplomacy Workshop in Namibia for 15 countries with Science granting councils in May 2017 in partnership with SARIMA, TWAS and AAAS

## Achievements: National

- ASSAf hosts the **Organisation for Women in Science for the Developing World (OWSD)** National Chapter.
- Hosts an Annual Young Scientist Conference
- Created, hosts and supports the **South African Young Academy of Science (SAYAS)**
- Hosts the **South African Academy of Engineering (SAAE)**
- Convenes various **conferences, symposia and workshops**
- Hosts **Distinguished Visiting Scholars annually**
- Conducts **Regional (provincial) lectures**
- Awards the prestigious **Science for Society Gold medal annually**
- A key partner of DST in the **Science Forum South Africa (SFSA)**
- Conducted various **Consensus Studies, statements, proceedings report for policy advice**

## Some of the studies

- Diversity in Human Sexuality: Implications for policy in Africa https://goo.gl/SDI9aC
- Zimbabwean in diaspora Meeting https://goo.gl/BzETEK
- Women in science: Inclusion and participation in Academies of Science https://goo.gl/fw2iTJ
- GMO's for African Agriculture: challenges and opportunities https://goo.gl/FodgY3

## Studies and Reports

- Science-Based Improvements Of Rural/Subsistence Agriculture https://goo.gl/oIgDNb
- The emerging threat of Drug-resistant Tuberculosis in Southern Africa: Global and local challenges and solutions https://goo.gl/dpDuwj
- Preparing for the future of HIV/AIDS in Africa: A shared responsibility https://goo.gl/GVlO86

## Studies and Reports

- Changing patterns of non-communicable diseases https://goo.gl/GxPwCC
- Preventing a Tobacco Epidemic in Africa https://goo.gl/e66SeS
- Regulation of Agricultural GM Technology In Africa https://goo.gl/CtWX4I
- Science, Water and Sanitation: Supporting Equitable and Sustainable development in Southern Africa https://goo.gl/cJGX1Z

## Challenges

- Access to other government departments other than the Department of Science and Technology
- Wider dissemination of consensus studies and statements produced
- Societal awareness beyond the science community
- Funding for **activities-** Operational funding well covered
- Critical mass of well resourced academies in the SADC for increased collaborative activities

## Our Contact Details

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ASSAf
ACADEMY OF SCIENCE OF SOUTH AFRICA

*Applying scientific thinking in the service of society*

**Appendix D: Presentation by Dr Gatama Gichini**

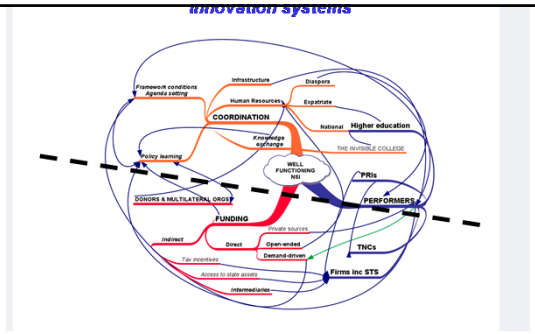
**Role of Strategic collaborations in strengthening the National System of Innovation,**

Dr. Gatama Gichini,
Ministry of Education,
Education Attaché,
High Commission Republic of Kenya,
Republic of South Africa.

## National System of Innovation

✓The **National System of Innovation (NSI) = National Innovation System (NIS)** - flow of technology and information among people, enterprises and institutions which is key to the **innovative** process at the **focus** level;

✓Innovation ???? - The guidelines on measurement of **innovation**, the Oslo Manual (**OECD**/Eurostat, 2005), **defines innovation** as *"the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.*




**Source – Prof. Michael Khan, Stellenbosch University**

## Framework Conditions

**A. Good Policy Framework condition in place;**

a) ICT Policy 2006 (under review);
b) E-Government Strategy;
c) National Cyber security Strategy 2014;
d) ICT National Master Plan 2017;
e) Science, Technology and Innovation (ST&I) Act 2013.

## Infrastructures

**A. Good ICT and Research Infrastructures in Place;**

a) National fibre optic infrastructure in place, All 47 Counties connected;
b) Four submarine cables are online (TEAMS, SEACOM, EASSy, LION);
c) KENET – 2nd largest NREN in Africa, supporting II5 organizations (universities, Research Institutes and other organizations) , manages largest IP network in Kenya, supports collaboration in STEM research;
d) E-Education - Laptop Programme;
e) Local Content Programme (Tandaa Digital Content Grants, Open Data Portal);
f) Konza Technology Park

## Agenda Settings

**A. Research and Innovation Priorities includes;**

a) National Telecommunications, Electronics and Computers (TEC);
b) Technology and Innovation Development;
c) Health and Food Security Technology and Innovation;
d) Information Knowledge System Technology Innovation;
e) Science, Technology, Engineering and Mathematics Education;
f) Coordination of Technology, Innovation and Commercialization;
g) Space Science;
h) Green Energy.

## Resources (Human and Funding)

**A. Research and Innovation Capacity**

a) 25 fully chartered public universities;
b) 7 public University Constituent Colleges;
c) 6 public research institutes;
d) 17 accredited private Universities;
e) 11 private Universities with letter of interim authority;
f) 5 private University Colleges

**B. Funding**

a) 2009-2015 – 35 out of 120 innovation projects funded by the National Innovation Fund;
a) 1st Research Infrastructure Call September / October 2016 Max Funding 1M USD.

## Innovation Space Snapshots

**A. University of Nairobi;**

a) FabLab - focused primarily on rapid/3D prototyping) as, and the C4DLab since 2013 as part of the School of Computing and Informatics

**B. Strathmore University;**

a) @iLabAfrica - established in January 2011 as a Centre of Excellence in ICT Innovation, Entrepreneurship & Incubation, and Policy Research for Africa.
b) @iBizAfrica was set up in January 2012 as an Incubation Programme.

**C. Kenyatta University (KU);**

a) Chandaria BIIC in July 2011. BIIC aims to support up to 100 innovators per year including 30% international students, blending research with entrepreneurship training.

**D. Jomo Kenyatta University of Agriculture and Technology156 (JKUAT);**

a) Nairobi Industrial and Technology Park in partnership with Ministry of Industrialization.

## ....Con ...Innovation Space ..Snapshot ....

**A. iHub launched in March 2010 as a Tech pre-Incubation and Collaborative Working Space, has three types of membership;**

a) White (Virtual – limited physical access);
b) Green (free shared space for up to twelve months for 150 – 200 individuals) and
c) Red (paid dedicated space for 12 months) members registered.

**B. m:lab East Africa;**

a) Launched in June 2011 as a mobile technology incubation centre by a consortium (eMobilis, World Wide Web Foundation, School of Computing and Informatics - University of Nairobi, iHub), with $725,000 seed funding from InfoDev (www.infodev.org).

**C. NaiLab;**

a) Business Incubator supporting entrepreneurial teams with mobile/web space innovations. Launched in August 2011 with support from Accenture and 1% Club, it provides collaborative working space, Internet access and mentoring.

## ....Con ...Innovation Space ..Snapshot ....

**A. GrowthHub**

a) An incubator and accelerator targeting Clean and Green-Tech, Mobile and IT, Agro-processing, Professional services and Essential Services (health, education, water and sanitation).

**B. 88 mph**

a) Offering seed capital ($1.7 million invested in 19 startups) and accelerator programmes targeting mobile and web start-ups, 88mph was launched by Danish investors in August 2011.

**C. Kenya Industrial Research and Development Institute (KIRDI)**

a) The KIRDI ICT Incubation program is focused on supporting an entrepreneurial culture to support the creation of enterprise start-ups; micro, small and medium-sized enterprise (MSME) and mentorship.

**D. Enterprise Kenya**

a) An initiative under the ICT Authority to develop a national accelerator which can provide mentorship, create ICT centres of excellence and establish an Equity fund to support ICT innovations.

**E. IBM set up a Research Lab**

a) Based in Nairobi to undertake basic and applied research focused on addressing African challenges.

## Innovation Space .. Achievements..Snapshots

The list is long and exciting; I'll cite just three examples.

**A. M-Farmis a mobile** platform for farmers – with touch of a button farmers can find prevailing prices for their produce;

**B. Ushahidi (Swahili for testimony)** - ground-breaking interactive mapping tool, now used across the world to crowd-source information in elections and emergencies;

**C. M-pesa,** the mobile money platform that has brought financial access to millions who were left out of the traditional banking sector.

## Lessons

**A. Communications and negotiations** among stakeholders generates an overlay that increasingly reorganizes the underlying arrangements;

**B. Reorganizations across sectors and Actors;**

**C. Exploitation of both place-specific local resources as well as external,** world-class knowledge to strengthen and enhance competitiveness;

**D. Open Innovation System overcomes** not only the boundaries of the firms but also the boundaries of the nation, region and professional specialization ***(Natural Scientists + Socio Scientists);***

**E. Identification of the technology foresight** weakness and strengthen;

**Thank You!!!!**
**Asante Sana !!!!**

## Appendix E: Presentation by ZaAS

## Overview of Zambia Academy of Sciences: Role in National System of Innovation

**Prof. Imasiku A. Nyambe**
**Fellow, Zambia Academy of Sciences (ZaAS)**

**Banqueting Hall, Royal Swazi Sun, Ezulwini, Swaziland**
**Wednesday, 21st June, 2017**

# Contents


- ✓ Bankground
- ✓ **Why ZaAS**
- ✓ **Future Aspirations – Role in National Systems on Innovation**
- ✓ **THANK YOU - End**


## Background

Ministry of Science, Technology and Vocational Training – born in 1991 /1992 through the recognition of:

1. Science and Technology: fundamental to sustainable socio-economic development of any nation.
2. Internal and External Trade: Realised through knowledge intensive technologies, which come from the translation of results from the scientific research and development work.
3. National Context: Consequence of insufficient attention to S & T and its role in national development process – led to the deterioration of the socio-economic development of the country – so the Ministry was created

Again realized that there was still a constraint to the effective development and application of science and technology due to lack of a clear **Science and Technology Policy**.
**Policy adopted in 1996**

## Background continued

**Mission of Policy:** to promote and exploit science and technology as an instrument for developing an environmentally friendly indigenous technological capacity in sustainable sustainable socio-economic development in order t… …lity of life for Zambia

**4 Goals**

- 1. Enhancing linkages between technology research institutes, private sector, public sector & encourage demand driven RD
- 2. Fostering national and international linkages for enhanced technology transfer
- 3. Facilitating the acquisition, adaptation and utilisation of foreign technology
- 4. Developing & sustaining a national scientific and technological capacity through provision of highly skilled human resource for increased productivity in the economy

Goals

## Background continued

**Followed by the Science and Technology Act of 1997 which gave birth to National Science and Technology Council (NSTC)**

**NSTC is** which is a semi-autonomous body to regulate science and technology in the country and is Committed to the Promotion of Science and Technology for Improved Quality of Life in Zambia with the 4 functions

## Background - continued

NSTC Functions

- Promotion and advocacy – the development of indigenous technological capacity; the use of science and technology in industry, the integration of gender concerns in science and technology development of broad national priorities in science and technology.
- Regulating research in science and technology including the registration of research and research development institutions and initiating special projects.
- Advising the government on science and technology related policies, the establishment of any new research and development institutions and national research development priorities.
- Mobilising and making available financial, human and other resources including science and technology information to research and development institutions.
- Coordinating research in science and technology in Zambia.

## ✓Why ZaAS

**ZaAS** established on 13th July, 2005 within NSTC guided by own **Constitution**.

**Purpose of:** advancing science including; life and physical sciences, medicine, engineering, mathematics, social science and technology as the vehicle for the attainment of sustainable development for Zambia.

**Major Functions:**

(i) to provide science evidence-based advice and guidance on scientific, mathematical, and technological innovation endeavours presented to it by government, private organisations or individuals.

(ii) to serve the nation as the repository and final authority on decisions on all matters related to science including medicine, engineering, mathematics, technology and social sciences – Supreme Courts of Science.

(iii) Science Think Tanks whose members *serve pro bono* as "advisors to the nation" on science, engineering, mathematics and technology

(iv) To promote, support, recognise and celebrate excellence in science and technology.

(v) To develop its role in the service of society; advise and inform the public on policy issues and development; and help improve public understanding of the value and contribution of science and technology to the social, cultural, economic and intellectual advancement of the nation.

## ✓ZaAS Strategic Plan 2016-2019 Going Forward

ZaAS Strategic Plan will serve as:

(i) a reflection of the Academy's appreciation of the prevailing situation in Zambia, the changing paradox, the aspirations and expectations of its current and potential members, and of a wider society as well as its own role and capacities.

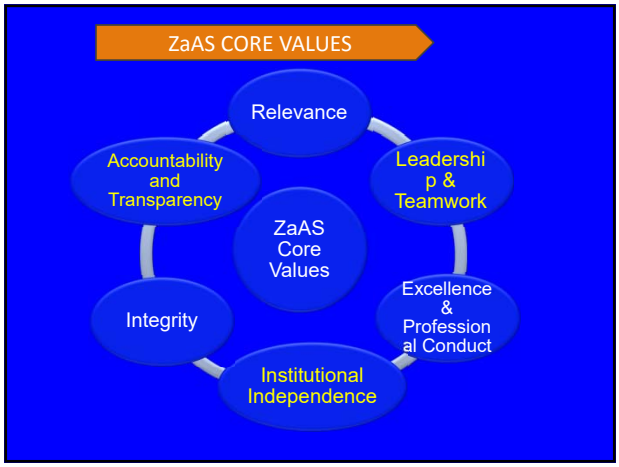
(ii) a public relations tool to promote the Academy's visibility

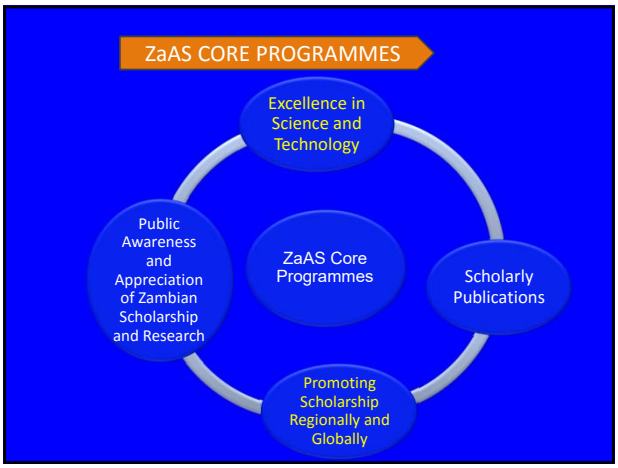
## ✓ZaAS Vision

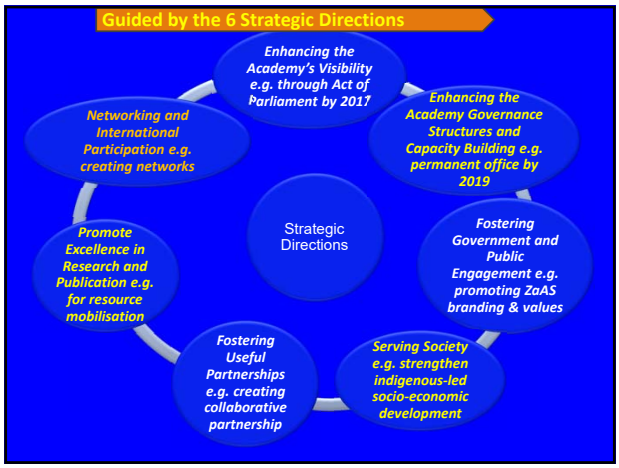
To have a country where science, technology and innovation become the vehicle of social, cultural and economic development.

## ✓ZaAS Mission

To promote and support excellence in science, technology and innovation for the advancement of Zambia.



## ✓OBJECTIVES OF THE ACADEMY

1. To promote excellence in scientific and technical endeavours;
2. To strengthen indigenous-led developments in scientific and technological endeavours;
3. To provide a forum for scientific thinking across all disciplines, including physical, mathematical and life sciences, as well as human and economic sciences;
4. To collaborate with the Patents Authority (PACRA) in order to support innovators to patent innovations and scientific discoveries in Zambia;
5. To stimulate and nurture the spirit of scientific and technological discovery and innovation in order to spur socio-economic development and contribute to regional integration;

## ✓OBJECTIVES Cont'd

6. To provide advice and guidance on scientific, technological and innovation endeavours presented to it by government, private organisations and individuals;
7. To foster exchange of information and networking between the Academy and other governmental and private/corporate organizations which have similar or related interests at the sub-regional, regional and global levels, in areas of science, technology and innovation
8. To promote the optimum development of the intellectual capacity in science of the Zambian people;
9. To collaborate with and provide support to institutions offering accreditation to training in science, technology and innovation in Zambia.

## ✓OBJECTIVES Cont'd

10. To facilitate, coordinate and undertake the publication of science, technology and innovation outputs in various media in order to advance the dissemination of scientific knowledge;
11. To organise, support and participate in commissions, lectures, seminars, symposia, training courses, workshops, conferences, consultations, exhibitions, reviews and appraisals in all aspects of science, technology and innovation;

## In order to achieve its objectives, the Academy shall:

1. At the request of Government, any person or its own initiative, investigate matters of public interest and concern;
2. **Facilitate, coordinate and undertake the publication and dissemination of scientific and technological achievements in Zambia;**
3. Promote, inspire and reward outstanding achievements in the different fields of science and grant recognition for excellence in Zambia;
4. **Engage in the planning, convening and coordination of science education in Zambia;**

## Achieve Objections – Cont'd

5. Establish reciprocal arrangements and enter into agreements with organisations with similar objectives at sub-regional, regional and global levels, in order to promote the exchange of information;
6. **Acquire any rights and privileges that it considers necessary or appropriate; Receive or give donations, and grants as well as receive endowments bequeathed to it,**
7. Purchase, take on lease or in exchange, hire or otherwise, acquire any movable or immovable property;
8. **Invest the funds of the Academy not immediately required for a specific purpose, in any one or more of the modes of investment authorized by law, and in any such manner as may be determined from time to time;**

## Achieve Objections – Cont'd

9. **Undertake any such other activities as the Academy shall, from time to time, decide in the quest to attain its objectives.**

## Activities of the Academy

1. **Through support of the German Academy of Sciences and NASAC, the ZaAS published Policy Makers Booklet on; Adaptation of Zambian Agriculture to Climate Change. *A Review of the utilisation of the Agro-Ecological Regions. 2013*"**
2. Interacted very closely with the Academy of Sciences of South Africa (ASSAf), the Zimbabwe Academy of Sciences (ZAS), the Royal Society of the United Kingdom and Pfizer,
3. **Workshop: Applying the Gender Lens in Science Education in Africa, Protea Hotel, Lusaka.**

Photo of Gender in Science Education Workshop hosted by ZaAS

## Activities of the Academy - continued

4. Seek membership or Members to the African Academy of Sciences (AAS), the Network of African Science Academies (NASAC), the *Global Academy of Sciences (TWAS)*, the *Developing World Network for Scientific Organization* (TWNSO), the *Inter-Academy Partnership* (IAP), the *International Council for Science (ICSU)*, and any other appropriate institutions as the Academy shall deem necessary
5. **The Academy has participated in several international conferences and workshops including some joint projects which have resulted in publication of policy booklets.**
6. With renewed energy in the Academy, ZaAS has, of late, been invited to participate in several international activities.
7. **The Academy will subscribe to International bodies in order to facilitate its participation in international scientific, technological and innovation activities and related issues.**

## ✓Management and Governance

Internal Management:
Secretariat managed by 7 people:
Executive Secretary;
Programmes Manager;
PR Officer/Communications;
Marketing Officer;
Receptionist;
Driver; and
Messenger/Cleaner

Governance at 2 levels:

1. General Assembly (all members): highest authority for policies & election of Governing Council of the Academy;
2. Governing Council (11 members) elected at General Assembly - governing body of the Academy responsible for the administration and general management of the Academy.

**Membership is drawn from a widely accepted mark of excellence in science and is considered one of the highest honors that a scientist can ever receive.**

## Future Aspirations – Role in National Systems on Innovation

## Zambia 's Competitiveness based on science, technology and innovation

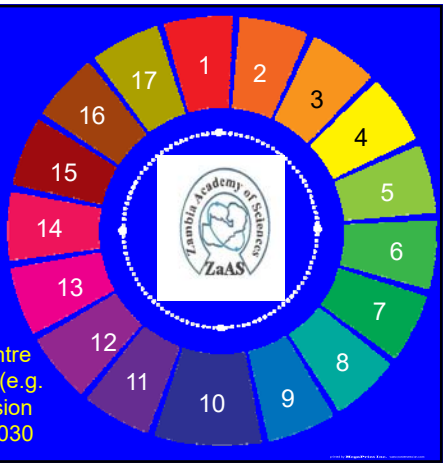
1. E.g. In Zambia SNDP (2010) "Recognises that economic advancement of any country depends on innovation, science and technological advancement of its people".
2. Vision: is "a nation in which Science, Technology and Innovations are the driving forces in national development and competes globally by 2030".
3. GOAL is "to establish an effective and efficient National Science, Technology and Innovation System for increased productivity and competitiveness" with a strategic focus that will enhance linkage between research and industry, increase human resource capacity in R&D institutions and improve the infrastructure and equipment.

**ZaAS Challenges**

- **Low membership**
- **Lack of a comprehensive scheme of service**
- **Lack of adequate office space and transport**
- **Limited relations with the public and potential members**
- **Lack of a documentation, library and information centre**
- **Weak linkage between the Academy and Policy Makers**

**Now with SDGs:** To participate fully in the 17 SGDs, 7NDP, Vision 2030 and Agenda 2030, ZaAS has to overcome some of its challenges

ZaAS at the Centre of the 17 SDGs (e.g. 4,8,9) 7NDP, Vision 2030; Agenda 2030



ZaAS finds itself challenged by Zambia's 7NDP in which priority is given to diversification in Agriculture, Mining, Energy and Tourism in order to industrialize, job and wealth creation

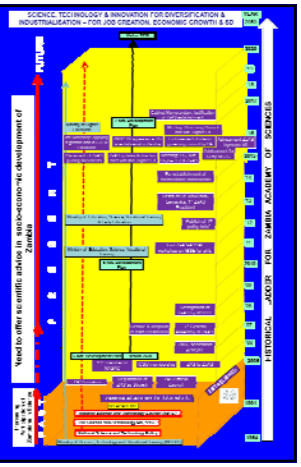

ZaAS should be involved in the globalized knowledge drive the global knowledge in Zambia, R&D and innovation, and be the driver of Zambia's socio-economic development and uplift the SDGs, 7NDP, Vision 2030.

## Conclusion

ZaAS acknowledges this high profile position in the country and will rise to its occasion to achieve this status

ZaAS sees the SDGs, 7NDP, Vision 2030 and Agenda 2030 as an opportunity to build and strength Academy

The Academy is, therefore, in a strategic position to utilize the opportunities available in achieving its objectives.



## ✓ THANK YOU

Physical address:

Zambia Academy of Sciences
National Institute for Scientific and Industrial Research
Plot 2350/M,
Kenneth Kaunda International Airport Road,
Lusaka, Zambia
Email Address:
zambiaacademysciences@gmail.com

At the Secretariat,
Mr. James Phiri BSc, MSc Executive Secretary (ES) and
Ms. Chisha Chongo Mzyece BSc, MIWM, Programmes Officer (PO).

**Governing Council, 2017:**

a) Prof. Kavwanga E.S. Yambayamba, President
b) Prof. Enala T. Mwase, V/President
c) Dr. Elder Moonga, Secretary
d) Dr. Alick Muvundika, Treasurer
e) Prof. Phillip Nkunika, Member (Life Sciences)
f) Dr. Henry Mwenda, Member (Physical Sc)

## Appendix F: Presentation by TAAS

# THE TANZANIA ACADEMY OF SCIENCES

# (TAAS)

## HISTORY AND BACKGROUND:

- The Tanzania Academy of Sciences (TAAS) is a non-political, non-sectarian, non-profit making national body of learned men and women in physical, natural and social sciences and technologies.
- It consists of persons distinguished in their own right and who are interested in the promotion, advancement and application of science and technology for human development.

## HISTORY AND BACKGROUND…….

- Tanzania Academy of Sciences was founded on 24th February, 2004 when twenty five senior Tanzanian scientists met and decided to form a science academy.
- The main driving force behind this initiative was Hon. Prof. Peter Msolla, then Deputy Vice Chancellor of Sokoine University of Agriculture (SUA), and later Minister of Communication, Science and Technology (MCST).

## HISTORY AND BACKGROUND…….

- TAAS as a learned, independent, non-for profit scientific organization, was registered as a Non-Governmental Organization (NGO) scientific body, on April 13, 2005, and officially launched on 24 June, 2005, in Dodoma, by His Excellency, Benjamin William Mkapa, the then President of the United Republic of Tanzania.
- Efforts are being made to have TAAS recognized by legislation. The academy consists of 131 members, including: fellows, honorary fellows, ordinary and associate members.

## VISION STATEMENT:

- The vision of TAAS is "To be the epicentre for promotion of excellence in the advancement and application of science, technology and innovation for national socio-economic development in Tanzania".

## MISSION:

- The mission of the academy is "To promote scientific and technological learning, and the utilization of scientific and technological knowledge, for national socio-economic development".

## PRINCIPLES, GOALS AND FUNCTIONS:

**The principles of TAAS are to:**

i. Nurture scientific knowledge and innovation, in order to improve and enhance the contribution of science in the everyday activities of a Tanzanian.
ii. Offer quality scientific services with integrity, and
iii. Work with efficiency to ensure optimal utilization of resources in generating valuable long term outcomes and impacts.

- **The major goals of TAAS are:**
- Promotion, advancement and application of Science and Technology for socio–economic development of Tanzania, and provision of quality, un-biased policy and strategic advice.
- In addition, TAAS is a platform for evidence-based opinion exchange among stakeholders, and for provision of realistic science-based policy responses and home grown solutions, that are in line with current and future national aspirations and needs.

## THE FUNCTIONS OF TAAS ARE TO:

i. Promote knowledge creation and innovation in scientific and socio-economic fields;
ii. Advise and provide policy and strategic advice on science, technology and innovation (STI) to society;
iii. Support and facilitate high quality scientific research and its applications, by availing competitive research grants and promotion of research projects;

iv. Promote dissemination and exchange of scientific knowledge through learned journals, meetings, conferences, seminars and lectures;
v. Promote science education through improvement of the national science education policy, content, standards, quality of the science curriculum, and science teachers; and
vi. Facilitate value-adding linkages and collaborations with scientific communities, within the country and abroad, through exchange programmes and fellowships, for training and research.

## STRATEGIC PLAN:

- The TAAS strategic priorities are designed to increase interest, and to incentivize use of science in society, through promotion of science education in kindergarten-, primary-, and secondary schools, and universities.

## CORE VALUES:

- The building of a cohesive, and a binding organizational culture, is a fundamental pre-requisite for the sustainable development of TAAS.
- It is the adoption and integration of our core values, that will ensure an organizational team spirit. The core values of TAAS are:

1. **Integrity and courtesy:** TAAS will offer its services with integrity and courtesy;
2. **Transparency:** TAAS will exercise transparency in the treatment of its stakeholders and the general community;
3. **Efficiency:** TAAS will work with efficiency to ensure economic use of resources in serving its customers;
4. **Innovation:** TAAS will strive to be innovative in its approaches and activities;
5. **Accountability:** TAAS will be accountable for its decisions; and
6. **Teamwork:** TAAS will exercise team spirit in the promotion of science, technology, and innovation

## Core Operational Functions of TAAS:

1. In the strategic plan, the TAAS mission will be implemented through the following principal operational functions:
2. **Research:** Coordinating and promoting efforts to enhance the conduct of nationally, regionally and internationally recognized research;
3. **Partnerships Building and Animation:** Forging and animating networks and partnerships to serve science, technology and innovation development needs of Tanzania;

4. **Policy Advice Generation:** Helping to shape national, regional and international public policies related to science, technology and innovation;
5. **Scientific exchanges:** Facilitating scientific exchanges (e.g., symposia, conferences, workshops, journals, Internet linkages) designed to promote increased excellence in national science, technology and innovation systems;

6. **Information Dissemination:** Collecting, storing, analyzing, and disseminating information relevant to the promotion of science, technology and innovation;
7. **Resource mobilization:** Mobilizing and sustaining resources for promoting excellence in the advancement and application of science, technology and innovation for national socio-economic development;
8. **Recognizing outstanding Science, Technology and Innovation (STI) talents and achievements:** Reward talent for the purpose of building national motivation and commitment to excellence in Tanzanian science, technology and innovation; and
9. **Institutional Capacity Development:** Building effective administrative, human, physical and financial capacity to deliver the core mission of the Academy.

## Strategic Objectives of TAAS:

The academy will dwell on accomplishing the hereunder mentioned strategic objectives:

1. Increased TAAS membership and their active participation,
2. Enhanced TAAS financial sustainability,
3. Enhanced TAAS administrative, human and physical capacity,
4. Strengthened networking, partnering and collaboration on STI,

5. Enhanced national STI excellence,
6. Increased mainstreaming of STI in national socio-economic sectors and the general public,
7. Strengthened access to STI advice by Government, Politicians, and regional and international governance institutions.
8. Strengthened indigenous and exogenous STI knowledge /information production, storage and dissemination.

## CURRENT ACTIVITIES:

**Collaboration, Advocacy, Policy Advice and Scientific Meetings:**

- The Academy has strongly promoted strategic linkages, networking and collaborations, as means by which scientific institutions can share experiences, resources, and knowledge emanating from scientific research; and has also provided evidence-based advice to Government and other stakeholders.
- In this respect, jointly with IAP, IAMP and NASAC, TAAS has participated in issuing authoritative statements on global issues. Recent key meetings and publications, include:

## CURRENT ACTIVITIES……

1. Engaging and Influencing Government and Decision Makers, 2009.
2. The Development of Agricultural Research Strategy in Tanzania, 2011.
3. The Implications of Climate Change to Sustainable Agriculture and Health, 2012.
4. *LIGHTING A FIRE* Vol 1, a book authored by 31 Tanzanian scientists, 2012.
5. Deliberations on Science, Technology and Innovation Inputs to the Tanzania Constitution Reform, 2013.
6. Is Tanzania ready for uranium mining?, 2014.

7. Implications of gas and oil exploration, production, and sustainably investing revenue: how best to prudently manage and invest gained revenue, to safeguard national interests, and to avoid the resource curse, 2014.
8. Implications of Climate Change to Sustainable Agriculture and Health, 2014.
9. Appropriate Technologies for Sustainable Energy in Off-grid Rural communities (Smart Villages Initiative)'in collaboration with Cambridge Malaysian Education and Development Trust, the European Academies Science Advisory Council, the International Science Programme at the University of Uppsala, and the Swedish Secretariat for Environmental Earth Systems Science at the Royal Swedish Academy of Sciences and National Kenyan Academy of Sciences, 2014.

10. "Genetically Modified Organisms (GMO) Technologies, Processes and Products: Which way for Tanzania?", 2015.
11. "The Increasing Occurrence of Cancers in Tanzania: Best options for Prevention and Control", 2015.
12. "Policy support to push for financing, quality and comprehensive analysis of Tanzania Science, Technology and Innovation (STI) journals, and coming up with strategies to increase quality and use of on line journals" 2015.

## COLLABORATIVE ENGAGEMENTS:

- **In partnership with the Royal society, IAP, IAMP, TWAS, NASAC and AAS, TAAS has facilitated scientists to attend international scientific training and conferences, and to access competitive award schemes, as follows:**

1. The Royal Society Pfizer Award, which is awarded to a young African scientist at the outset of their career, and to promote science capacity building. Two scientists from University of Dar es Salaam (UDSM) and Muhimbili University of Health and Allied Sciences (MUHAS) won the awards.

2. The Leverhulme Royal Society African Awards from 2008. which aim to develop and sustain excellence in science in Ghana and Tanzania scientists, by doing collaborative research with scientists from United Kingdom (UK).

- To date eleven scientists in Tanzania, in the areas of agriculture (including animal health), water and sanitation, basic human health research (including medicinal chemistry), biodiversity (including medicinal plants and green chemistry) and energy (mainly in the area of renewable energy), have won collaborative research awards with UK counterparts;

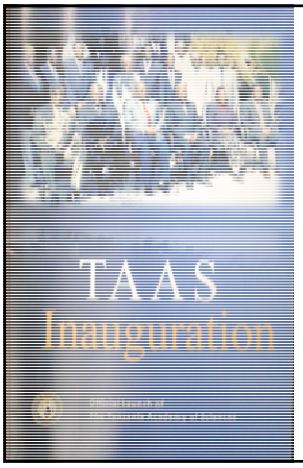
3. The TWAS-AAS-Microsoft Award for Young scientists, which is awarded to scientists who have earned their Masters or PhD degree within the previous ten years, and who have been working in Africa for at least two years prior to their nomination. Already one Tanzanian engineer has won an award under the scheme.
4. Support young scientists to attend international training, including information on TWAS award opportunities for doctoral and post-doctoral fellowships and laboratory equipments grants; and
5. Provided opportunities for young scientists in Tanzania to participate in international conferences and competitive opportunities, which have so far yielded two winners – a physician winning a young physician award from the Global Network of Science Academies.

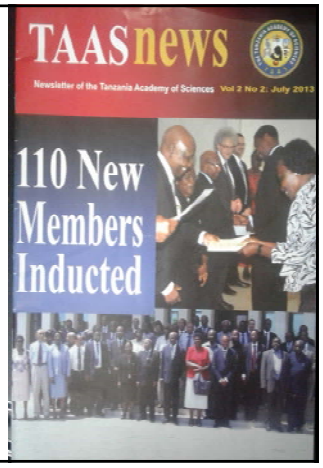
## INTERNATIONAL INSTITUTIONS WITH WHICH TAAS COLLABORATES:

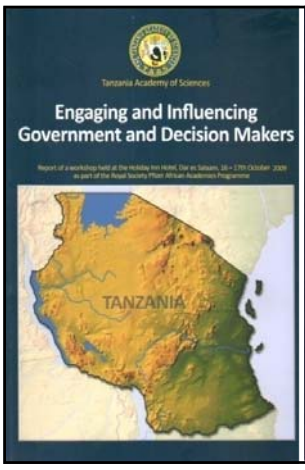
- TAAS participates in the Inter Academy Panel (IAP); Inter Academy Council (IAC); Network of African Science Academies (NASAC), and InterAcademy Medical Panel (IAMP).
- TAAS has linkages with the World Academy of Sciences for the developing countries (TWAS), the African Academy of Sciences (AAS), the Royal Society, UK, and National Academies of Sciences, especially in the African Science Academy Development Initiative (ASADI), and UNESCO. Its members have visited several science academies in the world to learn about their programmes.

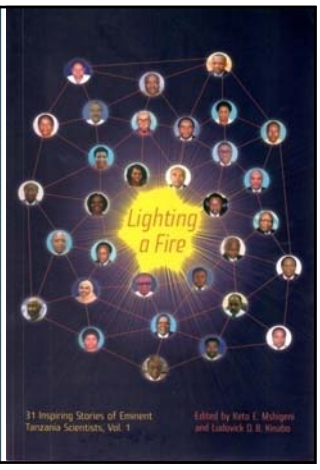
## PUBLICATIONS:

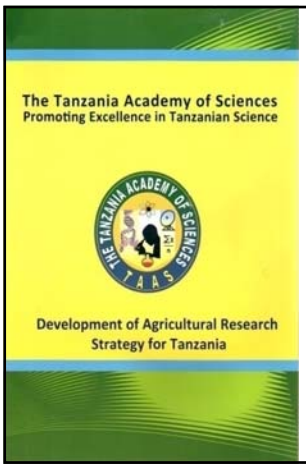
- TAAS publishes newsletters, policy documents, and books.
- See sample of publications in the next slides:

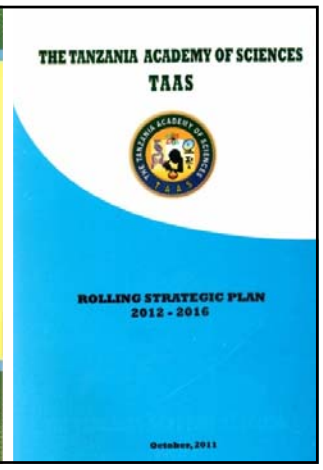


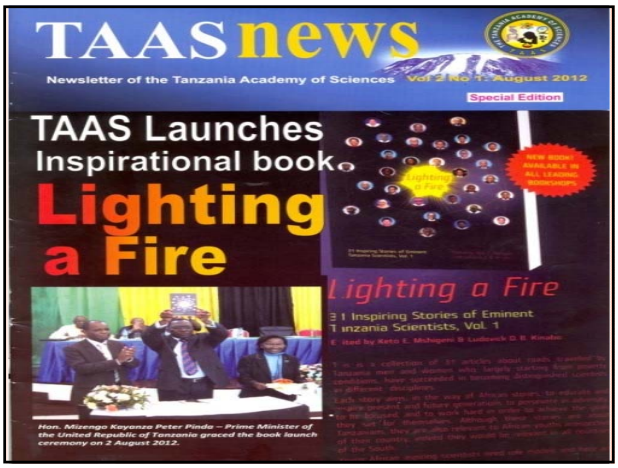






## PROPOSED FUTURE ACTIVITIES:

**Forum Studies: The current key policy and strategic issues, as per TAAS Strategic Plan, are:**

1. **Dissemination of information and applied tacit knowledge on science and technology in rural communities and primary and secondary schools, in Kiswahili. By such activities thus creating a Swahili Science Dictionary;**
2. **Gender mainstreaming, and promoting the enrolment of girls in science and technology related fields, in Tanzania;**
3. **Conducting independent research and open public lectures on policy and strategic issues that are important for national socio-economic development:**

## PROPOSED FUTURE ACTIVITIES:.....

i. **Using Science, Technology, and Innovation know-how and Tools, to Spur Climate Change Resilience and Adaptation, in Tanzania,** in the period 2015-2050.

ii. **Which future pathway for Tanzania's Agricultural Development for Combating Poverty?:** Family Farming, Industrial Agriculture, and Emergence of Genetically Engineered Technologies and Products.

iii. The **implications of land use and tenure in Tanzania's socio-economic development: Land use planning, access to land resources, and use.**

iv. **How to strike an eco-balance between accelerated and sustainable agricultural and industrial development, and environmental management.**

v. **Research and Utilization of Accessible Renewable Energy Sources and Systems, for Generation of Income and Employment, in Rural Settings.**

vi. **Addressing Future Demographic Factors and Trends in Tanzania: Shift of the population/labour dynamics, as Tanzania graduates from agriculture, to early industrialization.**

vii. **Health and Balanced and Equitable Development: How to cost-effectively address health issues such as rising cancer, diabetes, and communicable diseases in Tanzania.**

viii. **What needs to be done to change the perception among the Tanzania youth that science is hard and does not pay? To be done through publishing *'Lighting of Fire Vol. 2,* and**

ix. **The role and use of nuclear technology in Tanzania's energy mix, and in industry, in the next 50 years.**

4. **Collection, processing, publication and dissemination of science information and materials for use in the promotion of individual and national development; and**
5. **Supporting the implementation of policies and initiatives in strategic sectors by providing researched, evidence-, and science-based policy contributions and neutral strategic advice, that respond to stakeholder and national aspirations and future prospective opportunities.**

## Capacity Building:

1. Capacity building of scientists, and enhancing their skills, expertise, and experience, through multilateral linkages, training collaborations and long-term research and skills transfer exchanges;
2. Support the Academy and scientists in Tanzanian institutions, to publish in local science journals, which are at international level publication standards;
3. Support to the Academy to be recognized by legislation by creating a TAAS Act of Parliament;
4. To support and build the capacity of the TAAS Secretariat to kick start and coordinate the implementation of the initial activities; and to
5. Support TAAS to have its own home, which includes a building and facilities.

## GOVERNING COUNCIL:

1. Professor Esther Mwaikambo (President).
2. Professor Joseph Kuzilwa (Vice President).
3. Dr. Gratian Bamwenda (Secretary General).
4. Professor Yunus Mgaya (Treasurer).
5. Professor Ludovick Kinabo (Editor in Chief).
6. Professor Matthew Luhanga (Immediate Past President).
7. Professor Keto Mshigeni (Immediate Past Secretary General).
8. Professor Joseph Shija (Member).
9. Professor Ali Mshinda (Member).
10. Professor Contancia Rugumamu (Member).
11. Professor Julie Makani (Member).
12. Dr. Asifa Nanyaro (Executive Director).

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# THANK YOU!

## Appendix G: Presentation by ASM

ACADEMIA DE CIÊNCIAS DE MOÇAMBIQUE

# KNOWLEDGE FOR THE DEVELOPMENT

**Capacity Enhancement Workshop on ACADEMIES' COMMUNICATIONS, OUTREACH AND DISTRIBUTION OF SCIENCE-BASED ADVICE TO POLICYMAKERS AND THE PUBLIC**

By

**Dr Geraldo Nhumaio**

**Swaziland, 21 June 2017**

## Contents

Knowledge for the development

- What the ACM (Academia de Ciências de Moçambique) is?
- ACM Organic Structure
- Members
- Links/Networking
- Sellected Relevant Activities
- Challenges
- Closure



## The ACM

Knowledge for the development

- Organization currently under the umbrela of the Ministry of Science, Technology and Higher & Vocational Education
- Created 20 June 2009 (Act 29/2009)

**Objectives**

To disseminate national and internatio-nal scientific developments & streng-then links among scientists & Govt



## The ACM

Knowledge for the development

**Mission**

- *"To Cross"* the scientific knowledge
- To produce "brief reports" for the govt & advise as required
- To stimulate and promote scientific research
- To disseminate the science and its application in all spheres of activity in Mozambique
- To participate in Mozambique's development via evidence based studies



## Organic structure

Knowledge for the development

17 people
•9 board of dir
•8 admin.

Plenary

President

Executive Secretary

**SUPPORT STAFF**
- Chief of Dept
- Human resources
- Projects
- Finances
- Secretary
- 3rd party services

| Biomedical Sciences Section | Arts & Social Sciences Section | Natural Sciences Section | Tecnological Sciences Section |
|---|---|---|---|
| • Chief<br>• Secretary | • Chief<br>• Secretary | • Chief<br>• Secretry | • Chief<br>• Secretary |



## ACM Members

Knowledge for the development

- **Senior (Titulares)** (Mozambican PhDs with publications of merit)
- **Of Merit** (exceptional services and support in relevant issues in science, technology & innovation)
- **Honorary** (national and international personalities highly regarded in ScTI)

To date, ~100 members

- **Corresponding expatriates** (non-mozambicans with revelant international contribution in Science, Technology/Innovation)
- **Friends** of the Academy

## Selected Relevant Activities (2010)

Knowledge for the development

- ACM staffing & training (office, staff, ACM brand, communications, etc.)
- Scientific conferences/symposia/seminaries on
  - Biodiversity
  - Role of science education and dissemination
  - Hydro resources & development
  - Role of YOUNG scientists (in China & Kenya)
  - Food security
  - Climate change

In blue: more impact

- Creation of female science nucleous
- Turning on Science: Improving Access to Energy in sub-Saharan Africa' Policymakers Publication



## Selected Relevant Activities (2011)

Knowledge for the development

- Staff trainig inland & abroad (ASSAf, Ethiopia, Lisbon, etc.)
- Conf. on higher education curriculum developt
- Publication of summary book on public health
- Participation on 30th ICSU General Assembly
- Conferences on teaching difficulties
  - with local languages
  - in chemistry
- Book on Mozambican PhDs and about Mozambican PhD theses



## Selected Relevant Activities (2012)

Knowledge for the development

- Contribution on Science, Tech. & Innov. Law
- Contribution on "Report on the State of the Water Sector in Mauritius, Mozambique, Namibia, South Africa, Zambia, and Zimbabwe" led by ASSAf
- Participation on nasac-french academies´ seminar on communication strategy
- Participation on "Scientific Conference of the NASAC-KNAW Collaboration Initiative in Collaboration with MAST and Leopoldina - Water Management Issues In Africa"



## Selected Relevant Activities (2013)

Knowledge for the development

- Conference on the distribution of wealth in extractive countries – the role of academies
- Conference on food & nutritional safety
- Validation of the report "Responding to Climate Changes in Mozambique – Coastal Planning and Adaptation to Mitigate Climate Change Impacts"
- Conference on the role of natural resources on the promotion of Mozambique´s development



## Selected Relevant Activities (2014)

Knowledge for the development

- Designation of a representative of ACM for the IUPAC
- Establishment a Knowledge Exchange Hub in partnership with the Ministry of Environmental Affairs (replacement name nowadays)
- Technical and Scientific evaluation of projects submitted to the FUND OF MULTISECTORIAL RESEARCH, in partnership with the Academy of Lincei, Italy
- Participation in the TRAINING WORKSHOP ON ENHANCING FUNDRAISING SKILLS FOR SCIENCE ACADEMIES, Nairobi



## Selected Relevant Activities (2015)

Knowledge for the development

- Participation on the Forum ON OPEN ACCESS (OA) TOWARDS HIGH LEVEL INTERVENTION FOR RESEARCH AND DEVELOPMENT IN AFRICA, NASAC-Kenya
- Participation on The African Science Academy Development Workshop, Pretória
- Participation in the NASAC strategy plan AFRICA'S SCIENCE ACADEMY DEVELOPMENT AGENDA: Draft Strategic Plan (2015-2019)

## Selected Relevant Activities (2016 & 2017)

- Elections! Umbrella ministry now also congregates HIGHER & VOCATIONAL EDUCATION
- While getting involved, in depth, with ACM activities, currently appointed Minister, is in the process of integrating 2 additional branches (that can be puzzling!)
- Meanwhile, national (certainly world) economic concerns prevail (USD –vs– MZM challenge)

Knowledge for the development



## Links/Networking

- NASAC
- IAP
- ASSAf
- Leopoldina
- Academies of Science of
  - Italy
  - Lisbon
  - Ethiopia
  - Netherlands
  - France
  - Netherlands
  - Sweden
  - Sudan
  - Kenya
  - etc

Knowledge for the development



## Challenges

- Mobilization of YOUNG Scientists (employees mobility in uprising (mega) projects – grabbing approach!)
- Gender issue – scarcity of female participants/partners
- Funding in unsettled economy (hidden debths + devaluation of local currency)
  - 2010: ~30 MZM/USD
  - 2016: ~80 MZM/USD – required humility
- Governmental understanding of ACM´s ROLE is still weak

Knowledge for the development



## Closure

- Upcoming ACM did some visible activities in Science, despite challenging circumstances
- ACM still struggling to bring on board the governmental feeling about it
- Young scientists and female participants underepresented
- Funding is still a challenge

Knowledge for the development



# Thank you

Knowledge for the development

**Appendix H: Presentation by BAS**

# BOTSWANA ACADEMY OF SCIENCES

Role of Science Academies in Research and Innovation:
BAS development overview

21 June 2017

Royal Swazi Spa Hotel,
Ezulwini, Swaziland

## LAUNCH OF BOTSWANA ACADEMY OF SCIENCES

- The Academy was registered with the Registrar of Societies on the 3rd November, 2015.
- The Academy was launched on 10th November, 2015 by the Minister of Infrastructure, Science and Technology (MIST) at the Mokolodi Nature Reserve, near Gaborone, Botswana. The event was attended by senior officials, Chief Executive Officers (CEOs) in the Ministry (BITRI and BIH) and University representatives.
- A keynote address was provided by the President of the Academy of Sciences of South Africa (ASSAf), Professor Daya Reddy, who provided an overview of ASSAf and welcomed the opportunity for collaboration with BAS.
- The launch was in commemoration of the *Science for Peace and Development* day. The event included a star gazing experience that was led by Prof Medupe of the University of the Northwest in South Africa and his students.

## OBJECTIVES

- To recognize, support and promote **excellence** in scientific research and service performed by Botswana scientists;
- To **promote contacts** among Botswana scientists, and with the world scientific community;
- To strengthen the **global position** and role of scientific research performed by Botswana scientists;
- To **advise** the government on the quality of science in Botswana, as well as on scientific aspects of social and economic issues in Botswana

## OBJECTIVES

- To provide information on science and build support for science by the **general public** in Botswana;
- To **advise the government** on all issues related to science teaching and science education in the country;
- To ensure that in Botswana research is conducted in areas or on questions of **special importance and relevance** to science or the nation.
- In pursuing these objectives the Academy shall ensure the highest standards of **independence and impartiality**. Any recommendations or advice emanating from the Academy shall be merit-based and be made public unless exceptional circumstances make this impossible.

## FOCUS AREAS

The Academy shall be concerned with the natural sciences, mathematics, medicine and other life sciences, the engineering sciences, and the **integration** of these in the **social sciences** and the **humanities**

The Academy is envisioned to participate in the **social and economic development** of Botswana and in global issues in collaboration with external organizations and governments.

## Sustainable Development Goals (SDGs)


SCIENCE TECHNOLOGY ENGINEERING AND MATHEMATICS (STEM) COMMON DENOMINATOR

## STEM and INNOVATION

- **Innovation** and **research** in Science, Technology Engineering Mathematics (STEM) and related disciplines is a common theme in the SDGs
- Global challenges that affect all communities in the world
  - Climate change and global warming
  - Infectious and non communicable diseases
  - Growth of megacities
  - Policies and strategies to address global challenges

## BAS MILESTONES

- **Launched on 10 November, 2015**
- **General meeting on 24 February 2016**
- **Launched Fellows on 21 June, 2016**
- **Member of the Network of African Science Academies 9th November, 2016**
- **General meeting on 12 May 2017**

## BOTSWANA ACADEMY OF SCIENCES

- 2 tier membership (Constitution under review)
- Ordinary Member
- Fellow
- Board 8 members including 5 officers (3 year term)
  - President, Vice-president, Secretary General
  - Vice-Secretary General, Treasurer, 3 members

## LAUNCH OF BOTSWNA ACADEMY OF SCIENCE FELLOWS

"*The establishment of the Botswana Academy of Science (BAS) is a welcome development in our country and a testimony of my government's commitment to work with scientists to generate evidence-based policymaking. We, as a government, realised the importance of the Academy as a deliberate step to drive a science and technology led agenda to diversify our economy*."

His Excellency The President of The Republic of Botswana; Lieutenant General Dr Seretse Khama Ian Khama

Kasane, 21 June 2016

## ACTIVITIES

- **10TH GENERAL ASSEMBLY OF THE AFRICAN ACADEMY OF SCIENCE 21-22 June, 2016**
  - **Launched Botswana Academy of Sciences founding Fellows**
- **CLIMATE CHANGE BOOKLET 3-6 July, 2016**
  - **Expert presentation on Climate change and water policies: Science/action gap**
- **EDITORS FORUM 1st September, 2016**
  - **Botswana-based journal editors (3) participated at one day ASSAf meeting**
- **12TH ANNUAL MEETING OF AFRICAN SCIENCE ACADEMIES (AMASA) 6th-8th November, 2016**
  - **Endorsed launch on booklet on Social Protection**
- **12TH ANNUAL MEETING OF THE NETWORK OF AFRICAN SCIENCE ACADEMIES (NASAC) 9th November, 2016**
  - **Provisional membership of NASAC**
- **SADAC GENDER MONITORING AND MAINSTREAMING 5-6 APRIL 2017**
  - **Presentation by Botswana Science Academy Fellow**
- **COMMONWEALTH SCIENCE CONFERENCE 12-16 June, 2017**
  - **Attended by Botswana Academy of Sciences 2 members + 1 expert**

## Future Activities for BAS

- Benchmarking engagements
- Presentation of BAS at national institutions/external fora
- Participation at national, regional and international activities
- Discipline/sector structures/committees
- Strategic plan
- Policy development
- Funding strategies
- Academy legislation

## Research and Innovation

- National coordination (STEM/Sector structures)
- Identifying priority areas
- Project and policy development and implementation
  - Space Science, Research and Innovation Management, Quality Assurance and Ethics etc)
- Regional and international networking and engagement

**THANK YOU**

## Appendix I: Presentation by ZAS

# Zimbabwe Academy of Science

ZAScfbnhachi

## ZAS

- Founded in October 2004
- Started with 81 members
- Current membership 240

## The Objective of the Academy

- the pursuit, encouragement and maintenance of excellence in the fields of science and technology in order to promote the advancement of and practice of science and technology for the development of the nation and the benefit of mankind

## FUNCTIONS

- to promote the awareness of policy makers, and other stakeholders' understanding and appreciation of the role of science and technology in human progress;
- to promote creativity in the field of science and technology in a manner that enhances the professional development of Academy members and other Zimbabwean;
- to identify opportunities for intervention by science and technology in the economic and social areas;

## FUNCTIONS

- to continuously monitor the global developments in science and technology and flag those developments which are relevant to the Zimbabwe needs;
- to provide consultancy services to the public sector and other stakeholders on developmental issues for which the Academy has competence;
- to be of continuous assistance to society and government in science and technology;
- to initiate and sponsor multi-disciplinary studies related to and necessary for the

## MEMBERSHIP

- **FELLOW:** Fellows of the Academy are elected from such Zimbabwean citizens who by virtue of their respective achievements in the field of science and technology are regarded as being of exceptional merit and distinction and who can be expected to significantly assist the Academy in achieving its objectives.
- A Fellow is entitled to use **FZAS** after his/her name

## MEMBERSHIP

- **Honorary Fellows**
- The Honorary Fellows of the Academy are elected from such persons, not being Fellows, who have made or are making a distinguished contribution to the practice of science or technology which will benefit, or will be able to contribute to the work of the Academy.
- An Honorary Fellow is entitled to use **HFZAS** after his /her name

## GOVERNANCE OF THE ACADEMY

- **The Principal Organs of the Academy**
- The General Meetings
- The Colleges
- The Executive Committee
- Secretariat

## The Executive Committee of the Academy

- President
- Vice-President
- Secretary General
- Honorary Treasurer
- Deans of Academy Colleges
- Committee members, 1 from each Academy College

## The Colleges of the Academy

- **College of Life Sciences**
- Agriculture, Biology, Biochemistry, Food & Nutrition, Human and Veterinary Medicine, Environmental Sciences;
- **College of Social Sciences**
- Anthropology, Commerce, Economics, Education, Geography, Journalism, Political Science, Psychology, Population Studies, Sociology, Archaeology, History and Philosophy of Science
- **College of Physical Sciences**
- Engineering, Architecture, Surveying, Photogrametry, Astronomy, Geodesy, Earth Sciences, Physical and natural Sciences, Mathematics

## Secretariat of the Academy

The Academy is serviced by a Secretariat headed by an Executive Director.

The Executive Director

- is accountable to the Executive Committee through the Secretary General for the day-to-day administration of the Academy Secretariat
- is accountable to the Executive Committee through the Honorary Treasurer for expenditure incurred by the Academy Secretariat within the budgetary allocation
- act as the Minutes Secretary for the General Meetings and for the Executive Committee
- act as an *ex officio* non-voting member of Academy Committees.

## Strategic Objectives and Plans

- To establish an Act so as to have ZAS become a legal entity. This will give ZAS access to government funding and will improve its recognition as an entity
- Establish and maintain a journal of science and technology for Zimbabwe.
- To have permanent ZAS Office premises for stability.

## Strategic Objectives and Plans

- Source for institutional funding to ensure the sustainability of the academy through providing consultancy services to government, fundraising and responding to calls for proposals
- To get Colleges to organise annual scientific events to inform policy development and review in Zimbabwe so as to also increase ZAS visibility.

## Strategic Objectives and Plans

- Appoint a fulltime secretariat consisting of the Executive Director, Administrator, project officers, Finance Officer and a messenger.

## CHALLENGES

- Diaspora scatter (brain drain)
- Limited resources
- Under staffing
- Permanent “home”
- Poor membership commitment
- ZAS Bill

## Appendix J: Attendance Register


iap SCIENCE RESEARCH HEALTH
the interacademy partnership

# ROLE OF SCIENCE ACADEMIES IN THE NATIONAL SYSTEM OF INNOVATION
## BANQUETING HALL, ROYAL SWAZI SPA, EZULWINI, SWAZILAND
## WEDNESDAY, 21 JUNE 2017

ASSAf
ACADEMY OF SCIENCE OF SOUTH AFRICA

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## WEDNESDAY, 21 JUNE 2017

ASSAf
ACADEMY OF SCIENCE OF SOUTH AFRICA

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ROLE OF SCIENCE ACADEMIES IN THE NATIONAL SYSTEM OF INNOVATION
BANQUETING HALL, ROYAL SWAZI SPA, EZULWINI, SWAZILAND
WEDNESDAY, 21 JUNE 2017

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**ROLE OF SCIENCE ACADEMIES IN THE NATIONAL SYSTEM OF INNOVATION**
**BANQUETING HALL, ROYAL SWAZI SPA, EZULWINI, SWAZILAND**
**WEDNESDAY, 21 JUNE 2017**

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ROLE OF SCIENCE ACADEMIES IN THE NATIONAL SYSTEM OF INNOVATION
BANQUETING HALL, ROYAL SWAZI SPA, EZULWINI, SWAZILAND
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# Role of Science Academies in the National System of Innovation

Academy of Science of South Africa

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