Introduction

By Thabani Mthiyane, CEO of ATNS

The theme of AviAfrique2017 is: In Africa. By Africa. For Africa. It's about enhancing aviation sustainability in Africa within the global context. It seeks to exploit infrastructure and development participation of small to medium and micro enterprises (SMME) in aviation, to encourage development and growth.

We want to see growth for those SMMEs when we engage them in enterprise development. We do not want them to remain SMMEs for five years after we engage them. We want to see their revenues grow; their employment opportunities increase; their contribution to society develop, so that they go beyond the SMME space to compete with larger organisations on an equal footing.

Africa lacks aviation infrastructure for a variety of reasons. Wars, politics, colonisation and the like have all played roles. But it's an opportunity to deploy new technologies, to leapfrog legacy technologies that others must decommission and write down before reinvesting. Africa has this opportunity that we can exploit.

A recent study we conducted showed us that, at ATNS, even if we wanted to serve the greater African market today, we cannot. We need partners because there is much to do. We must work with everyone and we must share resources across Africa to fill the infrastructure deficit. Sharing is a key issue to maximise the returns on the investments for all parties. For example, it's pointless having two radars facing one another, just kilometres apart, across a border, essentially fulfilling the same role.

ATNS right now controls the airspace for Swaziland, Lesotho, and 80 nautical miles into the southern parts of Namibia. We can do the same in SADC (Southern African Development Community). We can share infrastructure. And it would save the airlines and the pilots communicating with five different controllers in five different zones for insufficient reason. We strive for efficiency.

Africa is set to become the fastest growing aviation region in the next 20 years. It's an incredible economic opportunity for the entire continent. We should capitalise on the opportunity, use it to foster trade with one another, to collaborate. Why are we happy to trade with the Americans and the Europeans but not each other? As Africans we can build our economies together, collaborate to create our own solutions to our own needs. According to our friends at IATA (International Air Transport Association) the aviation industry supports 6,9 million jobs responsible for $780 billion of economic activity in Africa. By the end of 2017 we will transport 70 million passengers annually.

We recognise aviation has the potential to be a strategic catalyst for growth in Africa – and we want to channel and accelerate that growth opportunity. As part of the innovation summit we once again ask innovators to submit their awards applications so we can recognise individuals who contribute to aviation through intelligent design, products, and processes that enhance the capabilities of the aviation industry as a whole.

ICAO as a catalyst for implementation of a common upper airspace in Africa

By Barry Kashambo, regional director of ICAO, Eastern and Southern Africa (ESAF) Office

A common upper airspace would deliver many benefits for Africa but has not been realised due to the many implementation challenges faced in the region.

Air traffic across Africa is expected to double by 2030 yet the airspace is inefficiently utilised. Individual states still take precedence in airspace usage and control and the result is that the African region continues to lag embracing the seamlessness of a common upper airspace that promises so many benefits for the region.

Some areas are faced by non-existent or old infrastructure. Performance-based navigation (PBN) and Aviation System Block Upgrades (ASBU) implementations lag in others while surveillance and air traffic monitoring (ATM) equipment is inadequate in some.

There are continental initiatives to resolve these issues from the various regional economic communities (REC) of the African Union that recognise the need for a common upper airspace. But they have too few qualified, skilled, and experienced people to deliver separately. Industry has offered enormous support. ICAO provides a forum for states and RECs to coordinate and engage, it provides guidance material and platforms for planning, implementation standards and recommended practices (SARP), and documentation for regulatory development – and more.

However, there remain a diversity of regulatory frameworks. Each region also has its own style of air traffic control, route structures are inefficient, and it's unbelievable that in this era we still have some regions relying on out-dated and antiquated equipment for control.

And then we face new challenges, such as congestion caused by growth and new entrants balloons and drones, which are an aggressive new entrant into our airspace and we expect will soon outnumber normal aviation. Remotely Piloted Aircraft Systems (RPAS) are different from drones and add to the complexities of modern aviation, there are many changes in commercial aviation, and the military. Are we ready for the major advances of these systems capable of increasingly faster and longer duration flights? And in some areas there is poor commitment by government. Generally speaking, aviation is not a commitment for African governments.

But Africa must change if we are to adequately deal with these old and new challenges.

The potential payoff is enormous. Lower CO_2 emissions and greener operations. Better safety. Many economic benefits, such as passenger time savings, lower fares and rates, being more productive, stimulating related industries, better fuel efficiency. Better use of our airspace and maximum utilisation by air operators. Reduced ATM personnel workloads, integrated ICT skills, harmonised regional interoperability, efficient route structures and sector capacities, and the ability to harness the new generation of navigation capabilities on aircraft. The economic opportunities are enormous.

But we cannot realise it until everyone sits around the same table and talks the same language.

We have to embrace some fundamentals. We must transition from aeronautical information service (AIS) to aeronautical information management (AIM). The old AIS is based on paper documents and telex-based text messages. They can no longer support the requirements of the integrated and interoperable ATM system that shares data quicker, more efficiently, more accurately, and more reliably – to make African aviation safer. Innovation is the only way forward.

Our role at ICAO is to continue strongly supporting implementation of the seamless concept as a driver to achieving its benefits, implementing ASBUs, and maximum use of scarce resources effectively; as well as assisting, advising, and guiding on emerging issues related to seamlessness and interoperability.

What are our next steps? Many countries could be sharing infrastructure and capabilities and services. We must harness the equipment to be able to achieve the seamless management of upper airspace. And ICAO is at the centre of this shift. Harnessing synergies is the key.

If we don't do this then Africa will be the continent left behind. Together we can move forward. ICAO can guide the process by providing a platform to harness the synergies to achieve common upper airspace in Africa.

ICAO: No Country Left Behind

Effective implementation of Safety, Security, Infrastructure Development, Technology Innovation, and Environmental Sustainability. What can be done to harmonise the effectiveness of this objective by states and/or ANSPs?

Moderator:
- Thabani Myeza, ATNS Executive for Commercial Services

Panel:
- Martin Simelane, Principal Air Traffic Controller (operations) for Swaziland CAA
- Admore Chirongoma, Air Traffic Services Manager at CAA, Zimbabwe
- Frank Kofi Apeagyei, Training and Research Development Manager in the Engineering Division at Ghana CAA
- Ifeanyi Ogochukwu, Chief Technology Strategist at Debbie Mishael Consulting in Nigeria

Myeza (moderator): We don't want to be the continent that's left behind. So what can we do for ourselves? Our discussion will focus internally, on Africans helping ourselves.

Discussion points: What are intra-Africa collaborative issues that should be privatised?
What can we learn from other sectors that have advanced their cause jointly to move aviation's cause forward? If legislation is in place, how do we create the functional environment where it can achieve practical benefits? And we are in a developmental state so we must reap the benefits of that state. We don't have a legacy infrastructure and equipment problem in Africa so there's no need to decommission old technologies. But we can deploy new technologies, like we did with GSM and wireless voice and data communications.

And what about our responsibilities on overlapping infrastructure and duplication of effort and resources? There are many examples of robust infrastructure. We must be smart if we don't want to be left behind, and we must grasp the low hanging fruit. We need people with the right skills in place so as we develop we can embrace them and the opportunities. We often forget the millennials. We need to embrace future generations and incorporate them in our plans today so that we can be sure we have enough skills to move forward.

Chirongoma (Zimbabwe): I'm really intrigued by a comment from the CEO of ATNS when he mentioned that we want to leave no nation behind. I find it interesting that none of us can be left behind yet we are collectively behind [the developed world].

We often want to send our people on training. But the decision-makers who select trainees often have little information on the plans for aviation's future. So there's a tendency to select people based on keeping everyone happy or without noting the benefits, or the internal objectives, of the training.

We have the capacity, intellect, knowledge, and innovation, as African states, to do many things as long as we collaborate. The problem with most states is we want to operate in silos, which really does not auger well for the development of our states. We want to deal with the developed states on an individual basis. We do not accept that within our own regions we have the requisite capacities and abilities and even the infrastructure to really resolve some of our own problems and challenges within the continent. We continue to get so-called assistance from the developed countries. And sometimes they bring training or equipment that is better suited to their own regions, advanced regions, which do not address our challenges.

In terms of training, it's my opinion for any [African] state not to remain behind, that we must have adequately trained personnel who can run with all the projects relating to the services in our

operations. I think it is sad that the situation exists where flights transit to South Africa from the north through some surveillance equipped air space. But when they get to Zimbabwe there's no surveillance. Yet there is surveillance again in the next state.

We could, as states, help each other. Yet we want to do things on our own and we fail as a result. We need to harness the expertise of our continent, our regions, and mobilise the expertise we do possess. African states are better positioned to address the challenges of other African states rather than the American or European states.

Simelane (Swaziland): Safety, security, innovation - most African states have inefficient policy-making and poor strategy planning. States must prioritise safety in budget allocations because we have many plans but they are not implemented [for lack of budget]. To improve safety, senior management in CAAs must establish and support effectiveness. Management must be responsible for implementing and maintaining safety systems.

Employees must be responsible for identifying hazards without fear. Notices to airmen (NOTAMS) are not reported in some states for fear of painting a bad image of that particular state, for example a fire at an airport. So they continue landing without knowing the proper fire category. They simply don't prioritise safety. We need top-down commitment.

There is a serious problem where the CAA is also an operator. Roles and responsibilities are not clear when operators are regulators.

We have many mushrooming academies in Africa but where we have differences in training we have serious problems. African academies must offer standardised programmes to harmonise training. Right now we have controller training in different countries, even the UK, where different standards are applied. The same is true for security. With ISIS as a global threat that's a problem; especially the threat they pose to aviation since they are very organised. State programmes and ANSPs must prioritise security in their budgets.

I believe the African Union should strengthen its ties to ICAO to help member states. One of the issues of not doing so is enabling influence by other regions on African operations. For example, the European Union (EU) supports my own country and, since they sponsor us, they have a say in what we do.

Ogochukwu (Nigeria): We need to know where we are headed and if we are on the right path to avoid being left behind because Africa needs to change the way we think. Most of the members of the aviation circle in Africa need to get involved in the ICAO processes so we can get to a position where we can benefit from the advances. But in order to do so we need to continue improving aviation awareness at all levels of government. We need support from government. Heads of state need to be aware. They want to keep their territories as a nation but they need to realise that to benefit they need to share the infrastructure that they have.

Apeagyei (Ghana): From the perspective of training technical people, what can we do better and what synergies can we bring? We must understand when training is offered it is specific to the needs of particular organisations, depending on their existing equipment and infrastructure. If country A still uses secondary surveillance radar (SSR) and country B has gone to Mode S then the training must clearly be different. It will be difficult to create synergies.

We must therefore ensure that we are able to help countries that haven't yet plucked up the revenue to advance their technologies so everyone can achieve the same standard of technology. Then we can standardise training for those organisations. It will save training expenses. People will be able to move freely between different organisations to where they are needed.

Inter-organisation communication in Africa can be difficult. While African countries communicate

well between one another some must return to their colonial masters following those African discussions. Then they have to return to the table with decisions made elsewhere that don't necessarily relate to the issues faced by African countries. There are also language barriers. Standardisation is difficult as a result. We must resolve these issues to pave the way to realising synergies.

Myeza (moderator): With the many training organisations encountered by African aviation organisations – are they achieving the right standards, are we talking, helping each other, trying to find seamless ways to train on the continent?

Chirongoma (Zimbabwe): I urge all states to really look at our situation for certification and training and find ways to collaborate effectively. No states should be left behind because every system is only as strong as its weakest link. We may have a number of states moving forward but if a few states do not match the standards of the rest of the region it weakens the whole region. The same levels of safety, training, and service provision must be achieved. I urge all to look at this and find ways to collaborate.

Simelane (Swaziland): African states must perform air traffic monitoring in Africa to support sustained traffic growth and operations, reduce costs, and achieve efficient flights.

Ogochukwu (Nigeria): Globally, disruption happens everywhere. We must create disruptions in African aviation. ATNS is leading that process today. AviAfrique should go forward and Africa must change the way we do things positively - Africa is emerging and everyone wants to be here so let's create an environment to attract people.

Apeagyei (Ghana): ICAO's no country left behind policy aims to help smaller nations. One of the ways to help is to contribute personnel to come up with proceedings and regulations aligned with ICAO. We have a problem where decisions are taken at state level but the technocrats are unable to implement.

In some cases the same people who make the decision to go ahead on a project then apply the brakes in another meeting. I also understand the language barrier is a problem when African states meet. And I agree that some countries' colonial masters influence decisions that become a problem in our African context. We need a harmonised environment moving forward. Africa consists of 56 countries. We have various organisations helping African countries to draft regulations to standardise and harmonise across Africa. We have meetings with big English, people speak, they make many decisions and that's where we stop. We need to move beyond the concept. But we don't have a master plan. We, as Africans, need to put more pressure on our heads of state because that's where the problem is. They don't recognise ATNS and other organisations. They have to make decisions and stick to them.

Myeza (moderator): There are positive green shoots to this discussion. We need to be able to expand and replicate our success throughout the region. At the end of the day it's not all that bad and if we can think regionally and replicate our successes and take them to the next level we will be in a better place.

A key discussion at the ICAO world conference in November will be where we can find the requisite resources. The resources will not come if we are not ready for them. You must segregate and find the revenue streams but with the right regulations and structures to ensure service delivery. It's not rocket science but we must do it or we will talk the same talk for the next 10 years and the banks will just look away. I'm an optimist. In 46 years from today it will be 2063 and the agenda document for then talks of a technologically transformed Africa where we can trade freely and travel together. It talks of a continent developed. I want my daughter to enjoy it. It's up to us to create that future.

SADC Upper Airspace Management Centre project

SADC member states chose to develop a fully integrated air traffic management system that will serve all members. The primary objective of the UACC is the seamless regional harmonisation of air traffic in the upper airspace (FL245 and above) in the interest of aviation safety.

Moderator:
- Jeoffrey Matshoba

Panel:
- Akbar Sultan – Deputy Director Aerospace Operations & Safety Program, NASA
- Ntsontso Joseph Molefi, DCA Lesotho
- Nokuthula Phakathi, ATNS SM: Engineering Planning
- Boni Dibate, CANSO
- Protus Seda, IATA

Molefi (DCA Lesotho): ATNS is already controlling the upper airspace and indicates we have not had any accidents. It has also resulted in fewer CO_2 emissions, which means we have minimum environmental degradation. We are sharing the costs for development of infrastructure. Some states have real financial constraints so they cannot develop infrastructure on their own. We also need to coordinate in-flight information sharing.

Seda (IATA): From the airline perspective there are clear benefits to coordinated upper airspace management. It's safer and more efficient. It reduces costs. And it improves bottom lines. Another panellist talked of sharing infrastructure and if we do then optimised resources translate into numerous benefits. For example, if its one airspace there's the possibility of free routing from one control centre that allows flights to move directly from one point to another. That reduces CO_2 emissions and improves fuel efficiency and that talks directly to the bottom line. There are many more such benefits. So let's open the skies and have flights move from one point to another.

Phakathi (ATNS): The primary interest in a coordinated upper airspace is safety. Yes, it also reduces costs, passengers pay less, and many other benefits, such as supporting trade, tourism, and it even talks to social-economic integration. Yes, the primary issue is safety but at the end we also talk to growing the economy and improving social programmes.

With all these benefits why has it taken so long to get to this point? We began in 1996 yet, although there has been movement, we are still in the initiation phase, so our pace is too slow. The task force has conducted feasibility studies into upper and even lower airspace management. It has learned that it is feasible to implement in SADC. Yet, still there has been no implementation progress.

Individual states are holding onto their airspace, reluctant to relinquish it for common management. They want to know, from a military perspective and cyber security, for example, how can they allow other states to invade their airspace.

Dibate (CANSO): Canso (Civil Air Navigation Services Organization) is an association of air navigation service providers. We ensure members work together, seamlessly, so when aircraft flies from one FIR (flight information region) to another only the pilot and controllers notice and it doesn't affect the passengers.

Each country is interested in controlling its airspace for security reasons. No country wants another country controlling its airspace. We need to look at this issue as countries, as neighbours. That's one of the reasons why this decision for coordinated upper airspace

management was taken years ago but never implemented. CANSO tries to influence at a high level the decisions that lead to action. But we need more members to join our organisation otherwise other organisations and states won't recognise our efforts.

Sultan (NASA): The primary benefit of NASA's participation is the multilateration (MLAT) radar or multi-antennae radar. That would benefit Africa in the traffic flows between South Africa and the Middle East and India or Asia, for example, as aircraft transition across the Indian Ocean. Standard ground-based tracking is sufficient for terrestrial transit.

I heard the challenges of my fellow panel members but despite the difficulties it looks possible. I say that because in the US we have 20 FIRs. We have 50 000 daily operations across them. At any given point there are 5 000 aircraft operating across the US. We're also controlling the surrounding oceans and the land mass is a quarter, to a third of the planet under control – that's a complex environment. So when it comes to upper airspace management we have the command centre that is the equivalent of what's proposed for Africa. The biggest benefits there are traffic flow management and safety. One of the big challenges in Africa is safety. Another is efficiency.

But we must also be ready to answer the question: how are we improving safety? That's how we'll get buy-in from stakeholders. For example, we could improve safety by sharing data, which would also help get buy-in from the stakeholders. Data from multiple sources gives views into the system for weather management in larger airspaces, allows better capacity management for flexible airspace too, and that brings us back to the radar data for the location data. If it's not available through the MLAT radar then you can use the ARTCC (air route traffic control centre).

ATNS Permission Planning process

A catalyst for aviation infrastructure development and a mainstay for airline business growth.

Moderator:
- Patrick Ndlovu, Executive Manager of Programmes at Denel Spaceteq

Debate:
- Dumisani Sangweni, ATNS Executive
- Chris Zweigenthal, Airline Association CEO

Zweigenthal (Airline Association): The process of the commission has been one of partnership in getting the right solution for industry. The maturity of the partnership has evolved in the past five to 10 years between ATNS, the airline industry, ACSA, and that led to collaborative solutions and decision-making for the common good.

The permission process has been to appoint the economic regulator for ACSA and ATNS legislated through the 1993 ACSA and ATNS Acts with amendments expected at the end of 2017 or early in 2018, with independence to balance the interests of companies that are effectively monopoly service providers, the users that are the airlines, and the passengers who are the customers.

Our mandate is to create the approach document with guidelines for permission application, tariff determination for five years, and service standards monitoring with infrastructure services at the right time and price.

It's important to get this right considering the context of the industry today. 2017 industry projections are global profitability of over $31billion with Africa projected to achieve an $800 million loss, SADC a $340 million loss, and South Africa a $100 million loss. Other projections are that air transport will double in the next 20 years with 1 000 additional aircraft, 20 000 additional aviation technicians and engineers, and rising requirements for general commercial and specialist skills.

Air transport's contribution to South Africa is extensive; it includes 490 000 jobs, 70 000 of them direct air transport jobs. The industry represents 3,5% of GDP, gaining $140 million in foreign direct investment, and growing tourism expenditure that does, however, need more work.

Issues with the permission process are undoubtedly due to the timetable. There is concern over the limited planning and consultation period that ran from January to June, 2017 while the actual date of submission was the end of October, 2017.

We need better certainty about the timetable. The normal timetable ideally commences with planning in August/September of the year prior with a planned submission date of end of June the following year. But this time there have been disruptions due to various delays. And that jeopardised many projects.

In consultation it is clear that we need transparency with regular committee, companies, and industry participation, more lead time for planning and meeting deadlines, and representation across the roles, including AASA, BARSA, IATA, airlines, and passengers. We have to work together as industry.

Planning proceeded well for critical areas and everyone co-operated. But there has to be trust between the parties. There was healthy debate concerning all interests and it was noted that the

regulating committee also needs technical consultants appointed earlier to get the submissions into play quickly. Critical elements include CAPEX, traffic forecasts, OPEX, WACC allowable returns, and tariffs payable by users.

Proposals to improve include realising we need the part time regulator to be fulltime. Even a super regulator can be considered. We can combine regulators outside and inside transport, which are adequately resourced, and avoid duplication with single, shared consultants instead of multiple consultants, and deliver a combined economic forecast. We need to resolve funding processes, create a core regulatory structure, and deal with specialisations by industry.

In conclusion, it is necessary to have permission. Without regulation companies determine their own tariffs and dictate what services they will provide and at what price – which is unacceptable. However, we must stick to timetables and reduce delays to deal with the capacity squeeze, provide certainty and predictability, and avoid tariff spikes and troughs.

Further engagement is necessary prior to the next permission process but we must not overcomplicate it to enable promotion of potential new business.

Sangweni (ATNS): I will talk about the regulatory framework and the broader process that governs the permission process. I will look at this from an ATNS point of view and you will see the level of detail and work that goes into the permission for application process, for the 2018/19- 2022/23 period. This also applies to ACSA that runs in synchronicity with ours although they have different approaches and plans to execute. We also look at internal processes, have a modular approach and governance structure and project management and some of the models for traffic forecasting. And we are governed by the Act. The committee has requested ATNS to commence with the consultation process as soon as possible to effectively submit its permission application for June 2017.

The regulating committee issued a schedule. It is extremely detailed and very tight with many activities contained in the 12 areas. The submission was originally called to be complete by June 2017. But we knew that would be tough. As we stand it's late and has been rescheduled to be delivered at the end of October, 2017. We are looking at final gazetting new tariffs by March, 2018.

We have to follow procedure; that includes registering in the programme office and establishing committees to align internal and external processes to help meet the deadline. The modular approach looks at components such as front-end modules such as traffic forecast and future operating environment and sets the course for the other core modules that drive the plan for the rest.

Everything wraps up into the financial plan, which is the model to drive revenues and determine expenditures and other components to arrive at a bottom line. We have haggled with users to determine return on equity that in turn determines tariffs and that helps us achieve draft tariffs. This is subject to a governance structure. We have to have approval for application at a board level considering the fiscal ramifications.

With all the modules that had to be approved the timeframe was too tight.

The project is sponsored by the CFO in ATNS, we have a programme manager and the module managers, who form the project team. We engaged in the user consultation process to approve these models for ATNS and conducted a series of eight consultative engagements with industry in nine months. That attests to the level of maturity of the role players. We haggled, there was tension, but we found each other by the fifth or sixth consultation and agreed on the critical modules.

Then we developed the financial module that was approved in September. The future operating

environment (FOE) encapsulates our future thinking that is ultimately what the permissions are about. It sets the content for what we will discuss. It is derived from the air traffic management roadmap, which takes from the national air space master plan and articulates the future ATNS plan as we want it to evolve over the years. We discussed this at length to confirm the FOE.

Traffic forecasts are essential to determine how much air traffic services we will need in future. We obviously approached this with ACSA. They have their own models. And we have agreed after robust discussion on a forecasting methodology.

In the past we focused more on macro economic variables such as GDP and oil price, almost trend-like analysis adjusted for seasonality while they were talking to fleet and network decisions taken by the key players. We consulted back to industry, and with ACSA, and aligned after that.

Now the issue is time. We need to be afforded proper time to plan and assess to link this to the programmes, whether it is CAPEX or human capital rollout. One of the things we did discuss with industry, going forward, we will try to keep modules such as the traffic forecasting module alive by rigorous consultation even after permission is approved so by next time we don't start from scratch and also so we can advise and brief one another on changes in industry.

Moderator: The permission process is a necessity, and we need a focused, fulltime regulator to address the issues, because in between permission applications much work must be done for monitoring and also for planning and preparing for the next permission application. Our shareholders do a good job but they are not fulltime and resourced. That's a challenge. We are looking at a single regulator in our space but also to include other areas of transport, such as rail. There is a lot of work to be done and that has been on-going for eight years.

ATNS has proposed the future operating environment (FOE) model – what's your take as the user, Chris [Zweigenthal]?

The FOE module is part of the discussion and ATNS put the proposal together and revised it so it obviously sets the tone for where industry is going and the new tech developments. And it is in line with the opening address for CAPEX and proposals to acquire what's required and not just what the vendors are pushing. So FOE sets the tone for CAPEX programmes and it is supported by OPEX.

The permission process is about tariffs to be applied to users, but the difficulty is striking a balance between growing and maintaining and evolving air navigation infrastructure while keeping airlines from going under.

Zweigenthal: That's the biggest debate for us. Clearly, in terms of legislation, both companies are entitled to recover reasonable commercial returns so the process and financial model is set up for certain return on capital and that's where average capital cost comes into the process. Clearly the balance is something we look at. When OPEX and CAPEX come in the aggregate is lost in SADC and Africa - we must ensure there are no huge spikes both ways, up and down, and we are hopeful that what will be submitted this time around will be CPI-related and maybe even less so, if it is within reason.

Sangweni: Chris [Zweigenthal] said it all and it has been hotly debated for the past 18 months. That's why FOE is critical, because it sets the parameters of where we want to operate. Of course there must still be discussion and industry took us to task over what we proposed and we had to respond to their robust comments. Hence no fewer than eight consultations, none of which were easy. And that's a strength of the process. It put us in rooms until we agreed.

Keynote speaker: Nthato Moagi

The innovator's journey and disruption.

By Nthatho Moagi

I want to take you through the innovators journey, which is my childhood story and also something that's a bit provocative at the moment – particularly in engineering and technology.

I come from humble beginnings in Soweto. I remember I only ever wanted to build stuff – and design. My mom bought me Lego and I found it exciting. In rural areas and townships we make stuff from stuff we can access easily on the roadside. And my mom was a factory worker and I never had access to robots. So when I wanted to shift to robotics Lego blocks it was a crucial conversation between me and my mother. I was 11; it cost R3 000, which was more than her monthly salary. I had to look around for alternative solutions because I really wanted to get into robotics.

And my other dream was to go to space.

In Soweto you don't see much growing up. But looking at the stars you get curious. And on TV I saw what goes on overseas. And I realised on this planet we're small like dust particles but the universe is massive. For me to leave the atmosphere and see earth and realise I'm just a speck sparked my curiosity. It was a driving force that drove me to study aeronautical engineering.

A magazine came out at CNA called Ultimate Real Robots. The first two issues were sold for R20 each. But after that, the third issue, the price went up. I got the first two editions of the magazine and with them the chassis for the robot and the wheels. But I could get nothing else. No motors, no brain, no software to program it. My mother could not afford the R200 every fortnight. There were many issues in that magazine's life and even today they're sold all over e-Bay and collectors prize them.

So I went through life, my childhood, that chassis and wheel haunted me for a while. What should I do, what must I do, to solve this problem? I was just growing up in the township. I couldn't even ask anyone what to study or what to do. I remember sitting with my math teacher and he said I must study actuarial science. "You'll make money," he said. Then he told me his childhood story about how in matric he wanted to become a pilot but he failed the entrance exam because he wore glasses. I already wore glasses by that stage. He crushed my dream.

I knew I didn't have to study actuarial science and could get into the aeronautics industry. I found a company called Denel and they gave bursaries but I was too late to apply. I told my teacher. That was before Denel bought Spaceteq to start the satellite division.

But there is a quote: "There are two paths in life: Should and Must. We arrive at this crossroads over and over again. And each time, we get to choose," by Elle Luna. I eventually joined Denel because I pursued my dreams. I maintained the mentality to push and strive toward my dreams. These decisions - always go for the must because that's where you get fulfilment. In fact, you can write two obituaries for yourself while you are still alive. In the one you achieve all your dreams but in the other you relax because you're too scared to try anything. Then decide which one you want.

In my university days, around third year, I realised I could design and develop all the toys I wanted as a kid. I knew how. I had the skills. But it was expensive. Then I thought it should be affordable. My dreams reached back 10 years to when remote controlled cars were the most advanced toys you could get. But technology had moved on. The simple robotics stuff I couldn't afford as a kid should surely be affordable by then. But I realised the kits were still comparatively

expensive. The kit that was R3 000 when I was a kid was by then R7 000. That was way too much.

In Africa 60% of future jobs haven't even been invented yet. So what are we teaching the kids these days? In my day it was the three Rs. Today we need the four Cs: communication, collaboration, critical thinking, and creativity.

Many Silicon Valley start-ups are based on social media. But a recent start up offered a juicing machine where you would buy packets of flavours and squeeze the juice in the machine from the fruit. But do you really need a whole machine for that process? Judging by the start-ups that actually get funding they lack real problems to solve.

But in Africa we have big problems. How do we grind maize in rural areas, for example? We need to focus on the real problems on the continent. By providing low cost educational robotics toys, toys to instil a broad mind set in kids, we can help to solve our challenges.

A Harvard study found that 19% of kids aged 4 have a genius-level IQ. But by time they are 12 only 50% remain genius, by 21 only 10% are close to genius.

So the education system is clearly failing us at the moment. So what's been instilled in us instead? We started life with a growth mind-set by figuring out solutions to problems. But we develop a fixed mind set as we move through life, thinking these are my capabilities and I can't do anything about it. You can see it when Grade 2 kids gets Grade 4 math problem they find it very exciting. But ask a Grade 8 to do a Grade 10 problem and they will tell you they didn't learn how in class. They don't realise math is built on foundation and they could figure it out.

So we try to teach critical skills from an early age. Kits start at R399 by leveraging open source technologies to create solutions for Africa. My mission statement is to spark the curiosity of the next generation of African innovators by giving them access to affordable resources and instilling a growth mind set. They can use the kits from Grade 4 to Grade 9 and its part of the curriculum.

I was going through all of this when I stepped into Denel Dynamics. I remember feeling this is a different space to university. In university we were free, but many young people who step into the corporate world feel chained down. And we are called the complacent generation. After two to three years we leave companies. But I think we are hungry for opportunities. We won't rush to start families and achieve and then look back on our legacies. That's because our parents told us we can be anything. So I'm trying now. I want to build a company big enough to buy a ticket to get me to space and overcome the hurdle of my eyesight.

The disruptive innovation theory – many companies that are industry leaders keep innovating. The industry disruptors always undercut the status quo. Airbnb in four years built a business of many rooms in many countries and experienced much more growth than other hotel groups that owned their own infrastructure. They could rapidly outpace the industry because they were progressing faster than regulations that the established hotel groups had to comply with.

People think disruption is a Fourth Industrial Revolution thing. But it's been going on forever. Electronics maker RCA was an American electronics company founded in 1919. They used vacuum tubes for their electronic systems. Their resellers made money not selling the units themselves but rather the replacement vacuum tubes that would habitually pop. Then Sony disrupted the market with its transistor technology. The problem was that transistors didn't habitually pop so most of the resellers didn't understand how they would make money. And they refused to sell the transistor technology. So Sony went to the big wholesalers and the rest is history. They created a new market that worked on high volume, low margin.

So how do we help ourselves create innovative disruption in the aerospace industry?

In my second year at Denel I created an innovation forum in the company. It focuses on moving forward through collaboration. Collaboration is an essential ingredient to disruptive innovation.

But overbearing regulations can hamper innovation. They have self-driving cars in America. That's because there were no regulations around self-driving in California for a full decade when the technology was still being invented, which allowed the industry to push the frontiers of what was possible. We need spaces like that in Africa where entrepreneurs can explore their ideas in safe zones.

Another problem we have in Africa is that we have few venture capitalists who risk investment in truly innovative projects. If we don't have investment, how can we improve our companies? We need to talk about how we take innovation forward, we need to get everyone in the room together, from the graduates to the CAA officials, and realise what we want to achieve and maybe get a better way to innovate. There are many solutions and recommendations but we need the intent to solve our own problems and innovate for ourselves.

Science, Technology and Innovation in the Aviation Environment. Moving Black Industrialisation Forward

The process of identifying and acquiring local manufacturers that can produce according to industry standards requires buy-in and support from all aviation stakeholders. The current lack of local suppliers can be resolved when the current challenges are faced together and following a clearly defined development plan.

Moderator
- Dr Sandile Malinga, COO of ATNS

Panellists:
- Dr Siyavuya Bulani, Senior Liaison Officer at ASSAf
- Ntutuzelo Vananda, Director at Department of Trade and Industry (DTI)
- Lawrence Zimba, Industry Support Manager at CSIR
- Mark Johnson, Portfolio Manager in the Advanced Manufacturing STA at TIA

Moderator (Malinga): The aviation industry is high tech, be it in the aerodrome sector, air traffic management, or in airlines. We tend to find that currently there's over reliance on foreign or original equipment manufacturers (OEM) and they bring the technology; but not only that. With the technology we import we are forced to import the concomitant skills to operate the sophisticated machines and the more costly skills to maintain and service the systems for long durations – anywhere from 10 to 15 years.

This is a challenge for the continent not only restricted to aviation. Our high tech balance of payments have increased, our patent share globally has reduced, and that indicates we are getting deeper into importing high tech know-how. This is a problem. It's a problem we must attend and the panel in front of me will look at that - how to increase local content in terms of high tech. We must understand in the context of the Fourth Industrial Revolution that is happening now and fast changing how we live and work and interact with one another.

Real intelligence and artificial intelligence (AI) are shrinking distances and breaking boundaries between industries and sectors. For this to happen as a country and a continent to industrialise, the small to medium enterprises (SMME) are key. When you look at South Africa and probably true for other countries, SMMEs constitute 90% of formalised businesses and employ 60% of the workforce and account for 30 to 40% of GDP. That's big. But one finds that on our continent SMMEs struggle. So I hope our panel will assist us in unravelling the issues they face and how we can help the SMMEs and industrialise the continent.

Knowledge workers are of the past and learning workers are what we have today because technology changes so fast. We need a learning workforce. We must commercialise those ideas and bring them to market, which is TIA's role. In all the sectors, be they fundamental or applied knowledge or commercialising those, government is key to create a suitable environment, hence the inclusion of the Department of Trade and Industry (DTI).

Bulani (ASSAf): Our future is in good hands when you listen to keynote speaker Nthatho and we should inspire more people to be like him and have his hunger to improve the continent's – and the world's – conditions.

There's a report on the data from the white paper on science and technology by the National Advisory Council between 1996 and 2016, and shows what the country [South Africa] has done well and where it lacks. Interestingly, the government is championing the review of the 1996 white paper on technology and science and developing a new white paper, so that's a good thing to review the policy documents when things don't work.

Also, government, through the DTI, wrote out a black industrialist policy to get more black people participating in industrialisation. Industrialisation is plagued by many challenges such as knowledge generation, research and development (R&D), gender equality, and more. We could afford young men and women more opportunities, a platform to engage. It is worrying and should be confronted by policy makers and implementers. ASSAf, although not directly involved, plays a role in providing evidence to influence policy in government, the continent, and globally.

Zimba (CSIR): From the CSIR point of view we concentrate on R&D but we have also contributed to industry because the I in CSIR is for industrial development. Even Denel originally stemmed from the CSIR so there is an advantage in creating SMMEs, which is what Denel was, that came from CSIR because we can spin out technologies and they can create a company from that. We must remember some of our previous efforts were innovative. We need that innovation again.

At CSIR we are deliberately going to work on industrial development, work that has included creating a portfolio led by the group executive, and created a programme looking at all our capabilities and how we can spin them off with SMMEs to run with them. And also we hosted the CSIR conference to focus on the ideas that work for industrial development. Another thing we started doing this year, due to our deliberate intent to support industry, was create concepts and programmes we piloted with support from government (Department of Defence) to take advantage of the technologies we have.

But to put a technology into an SMME becomes difficult. So we incubated the SMMEs and I agree totally with the keynote speaker, Ntahatho. SMMEs are very agile. When they were part of our organisation they moved fast, even in changing their minds. As a huge organisation we couldn't move as fast they do. So now you can already see the combination right there where we say as an organisation we focus on 70% of our business but include SMMEs where they can leverage the technologies for us.

Johnson (TIA): At TIA we are privileged to build on research and innovation to benefit the country. We also attempt to play a strong coordinating role to be active in the national innovation system. We realise it's important to not be a silo organisation and we must participate with other agencies and the private sector. It means we are strategic and valuable to play a bridging role between academic and commercialisation interests. We believe, in the context of the black industrialists programme, we have a valuable role to play to help companies and entrepreneurs to qualify and be active in the programme. There is a desperate need for funding, yes, but also for skills for the successful commercialisation of products – that's our strategic role where we add the most value.

Vananda (DTI): The black industrialists programme - we agree there's a need for collaboration between government and the private sector. But as government we must take more decisions in terms of transformation. Our main role is to ensure there is transformation in this sector, which is a largely untransformed sector. Black entrepreneurs must benefit from the programmes hence the black industrialists programme and aviation is a sector we target as one to support. In order for this industry to implement innovative ideas we must regulate but also provide financial support through this programme. We believe we can do this with industry. So we provide funding, markets, and other financial support. We support entrepreneurs with robust ideas who are 51% black owned up to a maximum of about R50m grants. So far we have submitted 50 projects for funding and 30 to other markets for support. We don't have any aviation projects and we invite you to come forward with innovative projects. We also do trade missions to other countries to

open doors for local SMMEs and entrepreneurs.

Questions:
Moderator (Malinga): R&D and creation of new knowledge is key to industrialisation - how can we in Africa use this to develop our industries?

Bulani (ASSAf): Economic growth is directly linked to inventions, innovation and improving life. It's interesting in the country when one looks at the data there's an indication our R&D expenditure has not increased much through the years. For example, government injected about R7 billion in 2001 up to about R29 billion in 2014. It seems like a lot but it's negligible, nothing, it's very little for R&D for the country. But further to that is an interesting fact that the biggest contributor to R&D investment is the private sector. People generally think its government. Higher education comes secondary to that in terms of R&D investment.

But the trend in the private sector has been to decrease R&D investments over the years while higher education has been increasing it slightly. Other interesting facts, if one looks at R&D expenditure as a country in the SADC region, South Africa's contribution sits around 89% expenditure, but when you look into sub-Sahara Africa, we are about 38% and the rest of continent collectively constitutes about 21%. For a single country that's a huge amount of investment and contribution considering there are 54 African countries in total.

In the greater, global scheme of things, we have declined from 0,5% to about 0,28%. That's negligible; we are not investing in R&D that builds industrialisation.

Asian countries, also including Brazil, have increased R&D over the years. In South Africa and Africa R&D spend has been bad and now SARS did not manage to collect enough money so things will get worse.

One of the important things of industrialisation; there's a direct link to human capital development that in turn provides incentives to R&D. An advantage in Africa is that we have a young population. We are the envy of many European countries in that regard. But we don't use it. We should tap that resource and use their knowledge.

This theme keeps returning – that R&D spend is too low to make a dent for industrialisation – and for how we prepare our kids for the Fourth Industrial Revolution. But the revolution is already here. So how far are we moving? The world will not wait for us and we had better act fast.

Zimba (CSIR): I see some SMMEs out there jump up and down because they have all the support here from our four organisations (DTI, CSIR, ASSAf, TIA). If you're an SMME and you're not excited, you should be. This is all you need. Don't go anywhere else.

At CSIR, how do we promote and leverage the technologies we already have to support industry? We actually incubate the SMMEs. As CSIR we are independent and work with SMMEs side by side so the technology they get from us they get to absorb into their own businesses. We don't just give it to them and leave them to their own devices. They may not know how to use it to their best advantage. So we give them the right platform.

From a civil aviation point of view we have a memorandum of understanding (MOU) with ATNS, established this year in May, and already have four high impact projects we are working on. We will take that to SMMEs who will tender for the projects that will emerge from ATNS.

Johnson (TIA): How can we help commercialise R&D? I think TIA as an organisation is privileged to have opportunity to de-risk the technology. Once technology is developed in the early stages it needs further funding to become acceptable to the market. It's technology optimisation not just productisation. We are fortunate in terms of technology that emanates from CSIR in collaboration with an SMME, the SMME can approach TIA to help them de-risk the

technology, meet the certification and regulatory challenges, so it is acceptable to get funding for commercialisation. That's a strategic role. In the aviation space TIA has established an MOU with ATNS and CSIR so we can integrate the collaboration. It's vital to collaborate in the value chain. That goes beyond CSIR. All other agencies in education and innovation use incubators to achieve the same effect.

Vananda (DTI): Government is key for anything to happen. Technology readiness level of most African-based companies, particularly SMMEs, is low. To drive meaningful technology localisation we must address this. And what's DTI's role? There's huge potential for African countries to localise technology. But the continent needs stability because that affects the investment we get. Kenya, Ethiopia, and other countries have great innovation in aviation, but the continent needs political stability and policies that ensure we drive localisation.

In DTI we have designated sectors for local content, that's a way to drive localisation of technology. We need to attract more investment and support the African companies financially. We do that. We take trade missions from other countries to our whole continent to exchange ideas and that's resulted in contracts already. We took a trade mission to Nigeria, Madagascar and others. It's good to open doors for black entrepreneurs in the aviation space. We also need effective implementation of our policies. Policies alone are not good enough. They must be implemented.

Despite the unfathomable pollution caused by aircraft, there is a profound socioeconomic benefit

The aviation industry is adamant in addressing environmental impact and improve the integrity of the environment through numerous programmes including a commitment driven through ICAO to lead states to implement state plans. Developing states still experience challenges with regards to financial investment to address environmental impacts whiles there is still a need to invest in socio – economic programmes i.e. electricity, education and employment avenues.

Moderator: Tsepo Peege, South African Representative on the Council of the International Civil Aviation Organization (ICAO)

Panellists:
- Siya Biniza, Senior Economist at Development Bank of SA (DBSA)
- Ian Cruickshank, Environmentalist at SAA

Moderator (Peege): This is a difficult issue to understand and almost impossible to measure. And there are two sides to this coin.

African airlines show increasing demand. In one year African airlines experienced a 6,5% increase in traffic, which is down from 9,8% demand growth in June 2017. All regions posted an expansion capacity in July 2017 and there was an average 6,1% year on year increase in capacity worldwide.

This brings 11 themes affecting air traffic demand to light in the African context. Geopolitics, data, Africa and Asia-Pacific, government, security and borders, privacy and trust, business models, economy, values and communities, environment, and technology.

Despite the cross-cutting nature and multiple links to other economic sectors, air transport received a mere 4,2% ($4,6 billion) of the total official development assistance (ODA) provided by all donors for economic infrastructure and services from 2005 to 2013. By comparison, road transport got 54,7%, which comes to $60,9 billion. Yet air is far more efficient than road, far better for the environment, and produces far less pollution.

It is, nonetheless, an exciting time to be involved in aviation and air traffic management in Africa. Africa has huge potential to develop, increase trading links, opportunities to grow economies, yet the continent is simultaneously hampered by poor connectivity and a fragmented air transport system.

Aviation is progressing. It will improve fuel efficiency by 1% per annum through to 2020 and, from 2020, net carbon emissions will be capped through carbon-neutral growth. By 2050 net aviation carbon emissions will be half of what they were in 2005.

Aviation also offers numerous benefits to the continent. The Development of Aviation Infrastructure Forum intends to explore the benefits of the aviation sector in social and economic development, prosperity of member states, as well as discuss, identify needs, and facilitate funding and financing, accelerate implementation of international civil aviation global standards and policies and global plans for aviation in support of ICAO's No country left behind initiative.

We are taking a global approach to reducing aviation emissions. In 2007 IATA laid out its environmental vision to mitigate greenhouse gas emissions from aviation by building zero-emission aircraft within 50 years and adopting a four pillar strategy to achieve this vision based on improved technology, effective operations, efficient infrastructure, and positive economic measures.

In 2009 IATA took a landmark decision to adopt a set of ambitious targets that include a cap on aviation CO_2 emissions from 2020 (carbon neutral growth); and average improvement in fuel efficiency of 1,5% per year from 2009 to 2020; and a reduction in CO_2 emissions of 50% by 2050, relative to 2005 levels.

The preamble to the 39th ICAO assembly and the global market-based measures convention states: "The future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world…" It continues to say: "ICAO should develop the principles and techniques of international air navigation and foster the planning and development of international air transport to meet the needs of the peoples of the world for safe, regular, efficient, and economic air transport."

International aviation requires the cooperation of states and industry. Collective commitments were announced by Airports Council International (ACI), Civil Air Navigation Services Organisation (CANSO), International Air Transport Association (IATA), International Business Aviation Council (IBAC), and International Coordinating Council of Aerospace Industries Associations (ICCAIA). Their commitment is to continuously improve CO_2 efficiency by an average 1,5% per annum from 2009 to 2020, achieve carbon-neutral growth by 2020, reduce emissions by 50% by 2050 from 2005 levels, market-based measures (MBM) that ensure fair treatment of aviation compared with other sectors, and MBM that does not impose inappropriate economic burdens on international aviation.

There have been notable achievements in reducing aviation emissions levels in several areas ranging from new technologies to operational improvements, sustainable alternative fuels and more.

Yet there's an organisation called Biofuelwatch that represents more than 100 civil society organisations worldwide. It issued a report titled: ICAO's aviation biofuels plan: a dangerous distraction. Greenhouse gas emissions from aviation are rising faster than almost any other sector so ICAO and the industry intend relying on carbon offsets – condemned by more than 100 civil society organisations last year – and on biofuels.

On the other side of this coin the Rainforest Rescue group says international aviation wants to achieve carbon-neutral growth by using up to 285 million tons of biofuels a year, according to ICAO. It claims that industry representatives don't admit this will mean palm oil jet fuel that will destroy rainforests in the name of green air travel and they consider ICAO's plans for carbon-neutral growth to be a deception of the public.

It seems the only truly environmentally friendly solution is to reduce air traffic. The climate protection measures ICAO is pursuing include trading CO_2 offsets and more efficient aircraft. It's important to note that carbon trading does not actually reduce emissions: the aviation industry is merely buying a licence to pollute, according to the group.

In that complex and complicated context I welcome our debaters.

Biniza (DBSA): That's a pertinent topic: aviation development should be pursued versus concerns around the environment. Unfathomable may seem an unpleasant word, environmentalists would say its very fathomable, they can quantify it too, but the general gist of my view, despite the environmental impact of the aviation industry is that we must pursue its development due to other benefits but must focus investments on different fuels.

The benefits of the aviation industry are the socioeconomic impact of travelling and moving easily and freely. There are benefits for tourism, economic benefit for countries, and non-economic benefits too such as the ease of moving people, exposing people to cultures and different ideas. Not just international tourists get access to SA due to air travel; there is also a of domestic travel due to the aviation industry.

There is an average of 1 200 000 domestic passengers annually. Clearly there is demand to move people domestically and demand for the industry to exist due to the human need for contact and movement.

The aviation industry is hugely innovative. They have developed UAVs. Multiple speakers have mentioned a lot of innovation coming from UAVs such as medical supply delivery for difficult geographical areas. UAVs are also good for industrialisation for middle income and emerging markets. Think of the auto industry – the main challenges are low labour intensity and low volumes of production, which undermines locating those industries in South Africa. But UAVs are more labour intensive, and we can meet the scale of demand and we have the skills.

Denel's South African Regional Aircraft (SARA) represents a huge opportunity to promote regional integration - the smaller aeroplane is environmentally beneficial and affordable for consumers, offers more regular flights, and promotes movement in closer spaces in continental regions. The aviation industry makes significant contributions to innovation and industrialisation in creating jobs, promoting trade, and creating growth.

A recent study shows that the industry employs around 300 000 South Africans. Direct jobs amount to about 58 000 but there are also thousands of catalytic jobs. If you think, airlines go well beyond the planes since they employ marketers, security and technical personnel and people in related industries. The aviation industry contributes around R75 billion or 2% to 3% of South Africa's GDP.

Aviation's impact on trade is not necessarily limited to volumes transported, which would be quite negligible, but rather the high value access South Africa gets to foreign exchange, to build forex reserves.

There are more advantages to the aviation industry's existence – the political and economic benefits of regional integration, for example. Look at the East Africa region where the aviation industry is a huge driver underpinning regional integration. In Africa integration is by and large a result of political will rather than based on economic reasoning and that's why, despite being established longer than European integration, it lacks because of the political rather than economic focus.

Aviation focuses on people movement, which is a huge enabler of regional integration. Rwanda benefitted, for example, with its airline. It's a business tourism centre in East Africa and that benefits them.

Now there's a bad side: the environmental impact. We should promote development of the aviation industry but we must ensure it has an environmental conscience and reduces its carbon footprint. A study by the Department of Environmental Affairs maps industrial contribution to pollution. Transport contributed 10,8% of total greenhouse gasses in South Africa from 2000 to 2010. The aviation industry was about 7,6% of that total. Most of the environmental impact from transport in South Africa is due to road transport. Aviation is relatively small compared to other sectors of transport.

The real alternative to air and road is rail.

So, overall, there are benefits to maintaining and growing the aviation industry.

But we have to ask: what is our role moving forward? Government and financial institutions can help develop fuel technology in the aviation industry. Beyond that manufacturing and aviation operations don't have such a severe environmental impact. It's an opportunity for the state and development finance to support new fuel technologies to create alternatives with less environmental impact.

In fact I find the fuel challenge interesting. It's a never-ending spiral. The result of global warming, brought about by burning fossil fuels, is higher global ambient temperatures. Those make planes less efficient which means they burn more fuel. So we have a significant role to play in curbing this issue.

And we have the innovation capability in this country. We have Siyabulela Xuza, a South African, who created a new type of rocket fuel for NASA, for example. Government can also help to expand the positive socioeconomic impacts of industry. And we are seeing the significant role ATNS plays in developing the industry and the economy. We must support those initiatives; there's a huge role for industry to play also in transformation and socioeconomic impact.

Moderator (Peege): My question for speaker two: What's the big fuss?

Cruickshank (SAA): Yes aviation is a polluting business. There is a detrimental environmental effect while we fly at 30 000 feet. The business model revolves around burning fuel. We have a dichotomy of fairly well off people buying tickets flying across the world yet using our services pumps out gasses that affect the poorest people who are unable to produce crops from climate change and will never get on an aircraft or have no concept of how to get on an aircraft. We identified this problem early on.

But our reason for existence is to make money and continue operations and expand global links. So how do we future-proof our business when environmental issues become more pressing? We are experiencing more turbulence and more super storms impact our operations. So when the world looks at aviation we need an answer or we will be given an answer, a stick instead of a carrot.

Of SAA's carbon footprint 3% stems from ground operations and that includes offices, staff – everything. The other 97% is the fuel we burn in our operations. So how do we mitigate that? Battery driven aircraft won't get close. We are stuck with liquid fuels but we still need to address the problem.

We have a number of programmes from the last five years. I'm more of a pragmatic environmentalist. We have a 10-year programme to counter our impact on the carbon space and what can we do to mitigate negative perceptions of aviation so people feel better for choosing SAA.

We have voluntary carbon offset. We support projects that are verifiable and approved. It's not the best solution maybe but it's a start, especially in the context of people fighting for survival on our continent. We had low uptake on this programme – it's not popular. We recycle stuff out the air and in the office and we have sustainable procurement policies. We are switching to find things that are better, like [environmentally] cleaner paper, better bottles, we serve food on bamboo instead of plastic; we're at the cutting edge and our programme is growing.

We also have an energy efficient programme with different hangar lights, we're putting up a solar farm, using cleaner energy, using less energy. All of this relates to the 3% but we still need to address the remaining 97%.

We address water use, which is already affecting our operations in the Western Cape. Aircraft

staying overnight must be cleaned and watered and that's difficult in water-stressed regions. Biofuels can be a contentious topic. Some say that palm oil will end up destroying rain forests to get biofuel. With an organisation and a hundred NGOs behind them they say it's a bad thing. But we conducted the first biofuel flight in Africa last year. We teamed up with the round table on sustainable fuels so we don't use anything that's not sustainable. We look at land use, water impact, long-term agriculture impact. So we don't want to destroy anything, we won't use palm oil at all. We have, at the moment, Solaris as our primary biofuel. It's a tobacco crop from which we harvest oil and a by-product is a high protein content product that we use to feed animals. It's already approved for chickens which means that we no longer need to import a million tons of soya to feed them. Plus we get to decouple from the global fuel market, we don't need to import currency to line someone else pockets. We can keep it in-house and the solution is local for the benefit of locals. Biofuel addresses so many local issues: jobs, the economy, and helping airlines because we also get a 4% energy increase over conventional fuels.

We also partner with WWF, FSC, RSB, and many others, and commit to goals. In our endeavours we want to be sustainable and credible and change the perception that airlines are bad polluters. We want people to look to us as leaders in green airlines. We want to be the preferable alternative for consumers to choose. The global scheme is voluntary – we've taken it up as an industry. We are conscious of the environment but also very pragmatic.

Moderator (Peege): Siya spoke about jobs and trade growth; those are good things. The glaciers are melting. Polar bears suffer. Global warming is on the rise. Water levels are rising, coastal cities are threatened. SAA has flown on biofuels. South Africa has green airports. ATNS is on the highway in terms of performance-based navigation (PBN) yet there's a cry against aviation that is already doing so much to be environmentally conscious.

Single African sky and functional airspace blocks: improving air traffic management

By Dr Hassan Daleel, Sudan DCA

The global operation air traffic management (ATM) concept is the fundamental framework that drives ATM operational requirements, objectives and benefits. A global ATM system is therefore one that meets agreed safety levels, optimises operations, is environmentally sustainable, and meets national security requirements.

The future growth of COMESA's aviation sector presents challenges and opportunities. COMESA's sustainable aviation strategy should balance sustainability, social, and economic factors.

The negative impacts of aviation include land use, noise, air pollution, climate change, biodiversity, water, and the social structure of local communities. Positive impacts, on the other hand, include direct and indirect employment with socio-economic benefits for passengers. COMESA's civil aviation authorities must develop safe and efficient air space with the capacity to meet reasonable demand by balancing the needs of users while mitigating the impacts of aviation on the environment.

The link between economic growth and aviation has become clearer and more important in the context of a global economy and society. The benefits are numerous and particularly pronounced where there is poor high-speed ground transport infrastructure.

But environmental issues impact the development of aviation in a number of ways. Regulation increasingly pressures airports and airlines to reduce carbon emissions. Airport growth is constrained when facilities reach their regulatory limits for operations or local community tolerance. And climate change is beginning to have a big impact on airport operations and aircraft en-route.

COMESA civil aviation authorities have a tough job. They must meet the conflicting demands of the airport operator, airlines, and reduce environmental impact. They also have to meet regulatory requirements, ensure sustainable long-term growth, maximise operational capacities and efficiencies, minimise operating costs, meet customer expectations, and ensure high levels of safety.

Air traffic is growing (and therefore the potential for more emissions) but there are a number of options to reduce the environmental impact of aircraft engine emissions. They include optimised cruise levels and routes, continuous climb departures and descent arrival and approaches, as well as improved ATM that reduces fuel burn.

Functional airspace blocks (FAB) are designed to improve ATM. They exist regardless of state boundaries, with performance-driven air navigation services and related functions based on co-operative service provision. FABs aim to improve safety, capacity, cost-effectiveness, flight efficiency, military mission effectiveness, and reduce environmental impact. They also have to consider traffic flows, be justified by overall added value based on technical, human resource, and cost benefits, ensure fluent and flexible responsibility transfer between air traffic services, that there is compatibility between upper and lower air spaces, and comply with regional agreements. The ultimate outcome for air traffic controllers would be to reduce their workload.

FABs are realistic in Africa. However, we must consider the regional and sub-regional groups with common economic, social, and political integration interests. Feasibility studies reveal that there

are several and that upper air space management is already delegated between some COMESA states. But, while these services have been provided for some time, communication, navigation, and surveillance services are poor. COMESA also has a long rainy season and thunderstorms particularly increase aircraft delays. Strategic traffic flow management (TFM) could improve the situation through collaborative convective forecast product, strategic planning, and collaborative routing.

The African Development Bank (ADB) has already funded the COMESA integration feasibility study. It resulted in a legal framework for upper air space control and the project has three phases being environment, construction, and operation. The plan is for a seven-year programme, beginning in 2018, to establish seamless upper air space based on harmonised civil aviation rules and procedures.

Closing

By Dr Sandile Malinga, COO of ATNS

Dr Sandile Malinga thanked all attendees and numerous other supporters this year as well as in the past, without whom the AviAfrique forum would not be possible and would not be a success.

He said: "This is the sixth edition of this summit. As ATNS we have come a long way and each and every year we grow and learn in what we and this summit has covered. There were a wide array of topics looking at everything from the basics to the core areas of air traffic management (ATM), issues of no country being left behind, and what the continent must do to not retard others but rather accelerate where we are. We also investigated upper air space management issues and how, as ATNS, we liaise and engage with stakeholders, the airlines, Department of Trade and Industry (DTI), and gaining tariff permission.

"We enjoyed the innovative discussions and we were inspired this morning by Nthatho, our young innovator, as young people and the challenge to allow them to move fast without retarding them. We looked into issues of industrialisation, how the environment is key and important to us, and lastly discussed programmes and activities from Sudan, and the Hornet military drone.

"We have covered much ground and the discussions have been frank, open, robust, engaging, stimulating, inspiring and therefore, on behalf of the ATNS board, our executive team, and staff, we thank you."