

ATNS AVI AFRIQUE Africa Aviation Innovation Summit 2016 White Paper Draft compiled by Mark Mansfield

Air Traffic and Navigation Services SOC Limited (ATNS) hosted the 5th annual ATNS AVI AFRIQUE Africa Aviation Innovation Summit that was held at the CSIR International Convention Centre in Pretoria.

The Summit took place from 31 October to 2 November 2016.

As a local and international platform for aviation discussion and debate, this Summit provided insight into the latest technology and sustainability advancements in this industry alongside innovative speaker topics and panel discussions.

Since its inception, this Summit has brought together global Air Navigation Service Providers, civil aviation personnel, researchers and thought leaders in order to engage in topics spanning everything from research and development in aviation, to aeronautical innovation and unmanned aircraft as well as the liberalisation of African airspace.

The Summit has grown from a one-day conference to a must-attend event that now included the AVI Awards, Safety Presentations and ATNS's Collaborative Decision Making (CDM) Conference.

The Summit theme for 2016 was "*Aviation innovation for regional integration in Africa, contributing towards economic infrastructure development and social cohesion*".

Looking at IATA's latest numbers, in the next 20 years going from approximately 3.8 billion people per year transported, it is going to double to 7.8 billion people across the globe per year.

Countries in Africa; Sierra Leone, Guinea, CAF, Rwanda, Togo, Zambia, Madagascar, Mali, are expecting 8% growth year on year. Africa's average growth of passenger numbers is estimated at 5.1% per annum, 192 million passengers transported in 2016 to around 303 million by 2035 forecasted by IATA.

This is the reason why the ATNS AVI Afrique Africa Aviation Summit is so important and relevant. It explores aviation innovation, it explores sustainability.

The goal of this year's summit is to provide room for critical insight and debate on various topics.

This paper covers the Summit part of the three-day event.

Since its inception in 2012, the Summit has taken a significant step towards establishing an integrated approach to innovation, research and development targeted at the aviation sector as a whole. It has grown in leaps and bounds since then.

This year's theme was 'Aviation Innovation for Regional Integration in Africa contributing towards Economic Infrastructure Development and Social Cohesion'. By way of unpacking this theme, we need to answer the following questions:

- How can Aviation contribute towards Economic Infrastructure Development and Social Cohesion
- What kind of support is required from private, public and/or Inter-Government institutions and entities (to address the above).
- Trends and Developments within the continent vs trends and Development elsewhere

ATNS is at the forefront of skills development and innovation and plays a major developmental and transformative role in the industry. This endeavour is supported by our Aviation Training Academy, which by the way has received a myriad of international accolades. This is a reflection of our determination to be a hub of excellence.

The Avi Afrique Innovation Summit has become a highlight of the aviation year because we offer the industry an opportunity to come together to hear some of the best minds talk about new developments and debate the future. The Summit also brings the industry together in one place, thus providing a chance to build new relationships with each other. Aviation has always been an exciting industry, and it's events like this that help to turn that excitement into achievement.

We acknowledge the significant store of value represented by our relationship with our stakeholders - to support the long-term economic and social sustainability of the business. These relationships are exemplified by the strength of our supply chain relationships, community partnerships, government and regulatory relations and our relationships with our customers, sector partners and the general public. Our social and relationship capital is also represented by the trust our customers and the general public demonstrate in our ability to ensure safe skies.

In this context, safety remains the first and overriding priority in air traffic management to ensure safety service provision to our customers and safe operations for our employees, partners, suppliers and the general public. As such, ensuring safety in our operations remains paramount and is not negotiable.

This extends to cultivating an intrinsic awareness of the impact our operations have on our natural resources – such as the use of electricity and fuel, the management of aircraft noise and carbon emissions – and to explore workable alternatives to curb our contribution to long-term environmental degradation. It also requires that we remain receptive to the needs and expectations of our various stakeholders, with safety and service reliability being the most critical deliverables.

Dr Neluheni, one of the guest speakers last year, pointed out that the opportunities for African innovation were very real. She said “in South Africa, the National Development Plan identifies the key role that reliable public transport will play in enabling economic growth. To implement the NDP, we need to focus on areas where the implementation of existing policies needs to improve, as well as overcome obstacles to implementation”.

Looking more broadly, Dr Neluheni alluded to the real opportunities offered by African aviation. For example, four of the world’s fastest growing air routes (passenger and freight) will be in Africa. However, to realise these opportunities, we can no longer take refuge in complaining about what does not work and what has gone wrong. Accordingly, she challenged all the delegates to resolve the problems during their lifetimes.

Both of these institutions have made, and will continue to make, substantial investments in aviation innovation, supported by robust R&D policies and strategies. If one believes, as we do, that African solution to African challenges is the way of the future, then the future of African aviation will be secured by initiatives like this.

The context for innovation has changed over the past decade: Global economies are increasingly dependent on innovation to remain competitive; the innovation process is more open and increasingly involves collaborations within and across borders; ICTs have become a key driver of innovation in all industries; and new global players have emerged. In this context, a major challenge for governments is to tap into and exploit global networks to access new knowledge and markets while generating value locally.

The challenge for governments is to tap into and exploit global networks to access new knowledge and markets while generating value locally. Given the fluidity with which people and firms can move, this is increasingly difficult. People and firms are attracted or deterred mainly by local factors. For innovative firms the most important factor is gaining access to markets and human capital. For people it is

the availability of opportunities: jobs, education and high quality of life.

Institutions of higher learning can play an important role by both producing and attracting the human capital needed for innovation. They can act as essential bridging institutions between players—businesses, governments and countries—in more open and broad systems of innovation. They also provide an important dimension of quality of life that can attract the highly skilled from around the globe. They can be the anchor for clusters of innovative activity that participate in global networks, while rooting value locally. The policy challenge is to encourage a view of universities as essential cogs in the innovation machine and possessed of independence, a competitive and entrepreneurial spirit, and flexibility.

According to Dr Michele Ruiters from the Development bank of SA, everybody is thinking that the world has gone mad that everything we thought we knew is been

unlearnt, it is the new 'norm' that everybody is referring to.

"In the aviation sector, it is trying to find a space in a world that is changing so rapidly in a technological level, and trying to find customers to attract them to an airline or a particular route and to maintain them. The greatest thing about change is trying to maintain that change. Innovation is easy, success is easy, but it is trying to maintain that success and change in trying to keep up." Said Ruiters

The GDP often does not explain what people are living in. You find in some countries in Africa where the GDP is very high the poverty or human development index is low. This is found in commodity driven economies like Mozambique and Nigeria. Where the inequality is vast. What we are seen in South Africa now is our own little Arab Spring that is showing us that the inequality is starting to stress. It is starting to expand. And, demanding for attention, we can see this in the Pretoria CBD. I would like to see in my lifetime is the economical social and the environment come together. The environment features a lot in the aviation industry, because of the carbon footprint of the industry. Carbon tax is used to gain more development finance so that we can do more social programs. Europe is already adding \$1 to airline tickets this has been done to raise more development funding. So, improvements can be made.

Regional integration is an extremely important concept that we have been struggling with for a very long time on the continent we have eight regional economic communities they are often at odds to each other. We have a mix of membership that often creates loopholes where members can fall through. The political integration of regional integration is very important. East Africa has done very well. Kenya is the driving economy in that region and Rwanda is also doing very well with ICT. SADAC not doing so well, Africa does not trade with itself but more with the external world. Intra African trade is less than 17% depending on the variables that you look at. We have an Africa that has a vision from the African Union that speaks to regional integration and been a single entity. This is the concept, but we are still different and within that difference lies our strength if we can find ways to work together on economic issues on political issues social issues. Dr Ruiters thinks that civil society is a hint from curbing this because there are ways that civil society such as universities, civil unions, churches that have worked together. We saw the fallout in Nigeria when the church collapsed, people felt that so far aboard because there is movement of people. It is very organic and does not often stick to us as politicians or development specialists think of in terms of the continent. China is the big bug-bear, China is building airports all around Africa. What we are finding is that there is a line down the middle the East of the continent is doing well. South Africa's growth is at less than 1% for this year (2016) which is unfortunate because SA was the diamond of the region at one stage and it needs to get back up there. 'We need to get the fundamentals right again'; said Ruiters.

An issue that resonates with Dr Ruiters is woman's development, and SME development for woman because it maintains woman at an economic level. More than 50% of the population across the continent are woman, we need to find ways to ensure that these women are engaged economically, socially and politically.

"Woman to don't have the same access to things as men do, because social experiences have men doing certain things and woman doing certain things." Said Ruiters.

Topic 1 – Aviation Innovation for Regional Integration in Africa (African Regional Social Cohesion)

Mr. Tshepo Peege, Representative of South Africa on the Council of ICAO at the ATNS AVI AFRIQUE Africa Aviation Innovation Summit (Pretoria South Africa, 31 October to 02 November 2016).

Aviation innovation has taken us even further and faster in the 100 years since the Wright brothers took wing. A few Aviation innovations that made the aviation industry to what it is today. Cabin pressurization, without this, we would not be able to fly much above 10 000 feet. Black Box, morbid but essential and was already developed in the 1950's not only to investigate accidents, but also to prevent similar future occurrences from happening again as indicated in Annex 13 — *Aircraft Accident and Incident Investigation* of the Chicago Convention.

Today everybody is replacing it with GPS technology, but for decades, it was radar that helped air traffic controllers locate and separate aircraft. Remotely Piloted Aircraft Systems (RPAS). Removing the pilot from the aircraft raises important technical and operational issues, the extent of which is being actively studied. Even though we might not be ready to board a pilotless aircraft today, it will happen in the future and we need to plan and be ready for this.

A milestone for South Africa and the AFI region is the operational deployment of Space-Based ADS-B in 2018. This will change surveillance as we know it. "We need to plan as a continent and adapt our regional infrastructure to support all the future innovations in a timely and coherent manner", said Peege

The world noted a great achievement in South Africa with the introduction of the first solar powered airport in Africa, and only the second in the world after India. George airport was immediately followed by two other airports – Kimberley and Upington. This is innovation in its prime.

Regional Integration is a process by which neighboring States enter an agreement to co-operate and work closely together to achieve a common goal. Usually integration involves one or more written agreements that describe the areas of cooperation in detail, as well as some coordinating bodies representing the States involved.

The Yamoussoukro Declaration is very well known. On 17 October 1988, the Ministers in charge of civil aviation of 40 African states met in Yamoussoukro, Côte d'Ivoire, and announced a new African Air Transport Policy that was subsequently named the Yamoussoukro Declaration.

It focused primarily on airline cooperation and integration in Africa. Another example of regional integration is the Abuja Declaration on Aviation Safety in Africa. The Declaration detailed high level commitments of the Ministers to provide a common frame of reference on aviation safety initiatives and aviation Safety Targets that were to be implemented within the AFI Region.

In revitalizing the Yamoussoukro Declaration, the African Union brought what is now called the Single Air Transport Market and sought a commitment from States.

To assist Africa-Indian Ocean (AFI) States to improve aviation safety, ICAO developed the Comprehensive Regional Implementation Plan for Aviation Safety in Africa in 2007. Under the AFI Plan many AFI States eliminated the Significant Safety Concerns identified through ICAO audits. Recently, based on the success of the AFI Plan, the Comprehensive Regional Implementation Plan for Aviation Security and Facilitation was developed and implemented.

To highlight the innovation by African Civil aviation through the AFI Plan, key decisions were taken at the last AFI Plan Steering Committee. It was decided to finalize the evaluation of the Abuja safety targets; establishment and operationalization of the African ANSP safety and quality assurance Programme; the development of a training road Map for Africa and the development of specific projects in the areas of aerodrome certification, training roadmap, ANSP peer review, SSP/SMS and SAR. What an innovation and what Social Cohesion! From an Industry perspective, we have AASA, AFRAA, CANSO, IFALPA, IFATCA, IATA, ICCAIA and many, many others.

The Aviation industry plays a vital role in the development of suitable and adequate infrastructure to support economic growth on the African continent and push for timely implementation. Airports and Air Traffic Management infrastructure development - essential to the growth and functioning of air transport services in the African region. It is the industry that drives the timely implementation of the infrastructure that they require as technology develops.

Regionalisation generates several benefits first for participating States and ultimately for the travelling public. It ensures overall improved performance of the aviation system at the global level and applies to the safety dimension notably by contributing to ensure an enhanced uniform level of safety across all participating States. Importantly, it prevents States that are part of the regional system from being left behind.

It enables the development of regional safety tools, such as regional databases for pilot exam questions (with appropriate data protection mechanisms), regional ramp inspection programmes, regional pools of inspectors and regional occurrence reports and safety recommendations databases.

Regionalisation also provides efficiency gains through increased regulatory predictability and reduced costs for participating States and for the industry. It helps to optimise the use of our critical resources for essential tasks, such as those that are safety and efficiency relevant.

Regionalisation is not a new concept. Over the years, it has been the subject of numerous discussions and deliberations, including in the context of previous ICAO Assemblies, high-level conferences as well as during the development of the latest draft version of the Global Aviation Safety Plan (GASP).

However, the focus of such past initiatives has, in most cases, been limited to regional cooperation aimed at supporting States in resolving safety deficiencies. Whereas this approach is and will remain necessary, the growing reality of regional aviation systems, in which the State and the regional level are further integrated, is not always well recognised and embedded in our planning mechanisms.

Planning framework needs to have the flexibility to enable future developments that are needed to support regulatory and market developments, regardless of whether they are conducted in a purely State-based context or in a more cooperative environment.

Topic 2 – How can aviation infrastructure and ops support economic development of Africa as a continent

Speech delivered by Lionel Bernard-Peyre, Airport Automation Business Development, Thales

By making use of the collaborative decision process making concept, arrival and departure management can be more efficient.

An airport is a very complex system. There are many different expectations from operators and airlines that make use of the airport, and combined with the air traffic control is a complex process that needs to be synchronized efficiently.

The key driver for this, is passenger experience. This is a key challenge for the airlines, and it differs between airlines, as well as the low-cost carriers.

For the air traffic control, it is safety first. The runway is the resource to be optimized and to give fair access to the runway to all users is key.

Only Ethiopia and Kenya have direct connections to more than half of the other African countries. So, where are all the other passengers travelling through? They are going through the Middle East to connect back to Africa.

African connections between African cities can reduce transport costs. This is key to growth in the continent going forward. Tourism and trade are catalysts for growth which requires support of regulations, infrastructure and the willingness to plan integrated aviation at a regional and continental level. The challenge is always s

implementation. 'We are good at talking and drawing up plans, but when it comes to implementing we have another meeting to talk about planning'. It is a real challenge to get implementation going.

Aviation is a major catalyst in market growth. Airbus in its market forecast from 2016-2025 shows over 19000 new aircraft delivered into the global fleet, effectively doubling the fleet size. Africa's share in this is 3% or 991 new aircraft between now and 2025. If Africa had regional growth and development, it should have a lot larger share. Increase in urbanization on the continent, which is driven by development countries moving from lower to middle income to upper income countries, urbanization is increasing. There are currently 10 cities in Africa that have over 4 million people living in the cities and by 2025 that will grow to 22 cities. The number of mega cities is growing; the number of aviation mega cities will grow from three currently to 12. There is large demand on aviation infrastructure. From this perspective, there is a lot of work to do by all stakeholders.

Aviation has the potential to kick start the African economy into the next level and will do it faster than any other sector. There are many enabling agreements that have been signed over the last years, some of them as old as 50 years, (YD), and that have never been implemented. Aviation infrastructure is there to be used by passenger and operators. In going forward, and planning aviation infrastructure we must take a more deliberate a more aggressive approach to engaging with the end users of infrastructure. Many of the users and operators have never been consulted and are unhappy of the result.

In opening skies, we need to look at the free movement of these hundreds of passengers within Africa. For example, to travel to Morocco, you might have to go via Paris, and then you must submit your passport up to six weeks in advance for visa requirements. This is not enabling. Integration as far as infrastructure is concerned, do not forget the users. Africa is still inadequate in airspace management, and aircraft equipment is being used more and more because of inadequate ground infrastructure.

20 years on and we still have no open skies, and there is not much implementation. Biggest problem seems to be the lack of implementation.

The SADC safety organisation is has already been setup, and the objective is to standardise all the aviation rules and regulations and have a pool of inspectors. The aviation community needs to pull together and not rely on government officials to implement things.

South Africa is equipped to begin and lead the role of collaboration into Africa. The key to collaboration is flexibility. If SA does not take the initiative, it will find itself doing something other than aviation. Innovation is also a mitigating factor and must be braced by the stakeholders, look at the SARA project by Denel Aviation.

Topic 3 – How can aviation infrastructure investments contribute towards environment sustainability?

Presented by Dumisani Sangweni – ATNS Executive

Climate change has been identified as a global risk requiring collaborative efforts from organs of state, global organisations and private entities.

As air traffic movements, cargo and passenger traffic are expected to increase, flexible optimisation of the airspace, airport and related infrastructure is required to ensure that safety and an operationally efficient and sustainable environment is achieved.

South Africa is a signatory to the Chicago Convention, which established the International Civil Aviation Organization (ICAO) as a specialised aviation agency of the United Nations (UN).

ICAO is responsible for developing policies, standards and guidelines for its Member States to implement standard and recommended practices (SARPs)

ICAO has, through the Committee on Aviation and Environmental Protection (CAEP), made commitments to curb carbon emissions in response to the United Nations Framework Convention on Climate Change (UNFCCC).

In the SA Context, which translates to other States and their organs in the region meeting their responsibilities to create harmonised and coordinated to responses by the region to ES.

ATNS and all other Department of Transport (DoT) entities and agencies, in line with its shareholder mandate from the DoT, are committed to meeting its responsibilities to environmental sustainability and integrating sustainability principles in their organisational activities, products and services.

These principles are aligned to global, international and national frameworks This enables strategic decisions to consider environmental impacts in the organisation's entire life cycle.

According to the Air Transport Action Group (ATAG), 'Aviation Beyond Borders,' July 2016 Report, air transport generated 781 million tonnes of CO₂ in 2015. This is around 2% of the 36 billion tonnes of CO₂ generated by human activities every year. 70% of jet aircraft in service today are well over 80% more fuel efficient per seat kilometer than the first jet aircraft in the 1960's.

Since 2005, IATA Green Teams have saved some 39 million tonnes of CO₂ by advising airlines on fuel efficiency methods.

By 2050, 50% of net carbon emissions will be half of what they were in 2005.

One way that the industry is working to reduce congestion and delay (and therefore fuel usage) is collaborative decision making (A-CDM).

Airport management techniques are incorporating environmentally-friendly features into airport infrastructure through, but not limited to:

- 'Green-certified' terminals
- Switching to vehicles with alternative fuels and energy sources

Infrastructure impact on fuel burn is influenced greatly by air traffic management:

- routes
- altitude
- and weather

All these initiatives affect fuel burn and carbon emissions.

CDM involves all stakeholders working together to make sure that flight profiles for airlines and users are optimised.

Therefore, Air Navigation Service Providers (ANSPs) and Air Traffic Services (ATS) and Airport Management Solutions play a crucial role in contributing to lowering emissions.

ANSPs working with regulators, airport authorities, aircraft manufacturers, airlines, airports, pilots and engineers to optimise ground and flight operations to improve overall aircraft performance contribute to the climate change agenda

The overall strategic approach for the Government of RSA's climate change response is guided by the National Development Plan (NDP) (Vision 2030).

The SA NDP's outcome 10- To achieve environmental assets and natural resources that are well protected and continually enhanced, proposes the movement towards a low carbon economy.

The DoT's strategic goal 6- Increased contribution of transport to environmental protection. Therefore, Department of Transport's (DOT) civil aviation branch facilitate the development of an economically viable air transport industry that is safe, secure, efficient, environmentally friendly and compliant with international standards, which includes infrastructure.

The SACAA has developed Aviation Environmental Protection (AEP) regulations in line with ICAO AEP regulations. These are integrated into CARS 34, 36 and 139 and CATS 139 (noise) and came into effect in December 2015 and September 2015 respectively. SACAA will conduct AEP audits and workshops as from 2016; focus on Int Airports and Aerodrome Ops.

In February 2016, ICAO agreed on a CO2 Standard will apply to all new aircraft models launched after 2020. Each new generation of aircraft reduces emissions 15-20%. Manufacturers of aircraft and engines spend \$15 billion a year on research to produce more efficient aircraft. Sustainable alternative fuels could cut CO2 by up to 80%. Over 2,000 alternative fuel flights have taken place so far.

Chapter 2 aircraft - have high carbon emissions, rank low on safety as maintenance is costly. Department of Transport implementing the phasing out of these types of aircraft. When developed, countries began phasing out chapter two aircraft from their skies, Africa became a "dumping ground" for the aircraft. Hence the heavy reliance on the aircraft types and delay in phasing out. Airlines on the Continent are investing in new aircraft for operational efficiencies and looking to reduce their emissions and costs. Very few aircraft on the SACAA aircraft register of 12,000 aircraft. On a global scale, Chapter two aircraft, which include 737-200s and 727s, have been banned from EU airports since April 2002, according to the European Commission. The region is now phasing out "chapter three" aircraft.

In the US, chapter two aircraft have been banned since 1984, initially for their contribution to noise pollution.

According to forecasts by Boeing, Africa will need 1 080 new aeroplanes over the next 20 years, valued at US\$140bn. According to Flightglobal.com, the global commercial aircraft fleet in service is expected to increase by 81% to 49,940 aircraft in 2035.

Air traffic to, from and within Africa is expected to grow 6%/year over the next 20 years, driven by the economic outlook, increasing trade links and a rising middle class. Airlines on the continent are investing in new aircraft and looking to reduce their emissions and costs. According to the Air Transport Action Group (ATAG), Aircraft already in service can have efficiency measures, such as wingtip devices which can reduce fuel consumption and cut emissions. Lightweight seats, food trolleys and cargo containers can help reduce fuel-burn and emissions. Using new satellite navigation technology can significantly cut emissions from the landing and take-off cycle. Using new air traffic control techniques to save emissions (PBN-CDO, CCO). Airports, airlines and air traffic control work collaboratively (A-CDM).

Aircraft technological improvements, new generation aircraft bring about 15%-20% reductions in fuel and CO₂ emissions because of advanced airframe, avionics and engine manufacturing techniques and technologies. Lower consumption and noise achieved by new engine technologies such as high bypass ratio engines and lighter, high temp resistant engine components and material increasing propulsive efficiency.

Lighter weight materials, electrical and innovative structural techniques that have increased use of composite materials by 50% reducing weight and optimising aircraft performance translating to fuel efficiency, on new aircraft such as Boeing 787 Dreamliner and Airbus A350. Airports moving towards online passenger processing, for example, e-ticketing, online check-ins therefore saving on paper consumption Green IT initiatives, for example, virtualization of server to reduce energy consumption and costs.

Airports are using alternative energy for ground equipment and to illuminate and heat terminal buildings. ACSA's solar power programme forms part of Airports Company South Africa's environmental sustainability strategy, a key element of the company's 2025 strategy. The company aims to achieve carbon neutrality in energy consumption and to run green airports that achieve a Green Building Council of South Africa six-star rating. This is "part of commitments to 123 airports to reduce their own CO₂ emissions," (ICAO; A39-WP/51 39th Assembly Working Paper) in a drive to achieve carbon neutral status. ACSA aims to complete solar plants at all six its regional airports (Port Elizabeth International Airport, East London Airport and Bram Fischer International Airport).

Panel discussion 2 – Hosted by Jeffrey Matshoba

Panelists:

- **Gawie**
- **Dumisnai**
- **Richard**

Today's technology and innovation revolves a lot around 'greener' technology, and reducing the impact on the environment. The challenge is to introduce the innovation into these new technologies.

There has been a shift to the amalgamation of views between BRICS, Arab countries and AFRI saying that Europe and USA were trying to push the numbers down and the rest saying it was not realistic.

This is an emotional subject, and due to this, it gets 'Played', and gets open to abuse.

The biggest investment in AFRI needs to be in CDM. Upper airspace management system needs to be up and running ASAP.

A 'Think out of the Box' mentality when it comes to innovation and a greener environment needs to be considered.

Market based measures it has been adopted in the ICAO assembly and some countries have reservations. It entails the emission levels must be locked into the 2020 levels, IE your carbon dioxide levels must not exceed 2020 levels.

2020-2030 is based on sectorial growth, as from 2031 it will be individual growth based.

To succeed, a political will is needed to take advantage of innovation and a collaborative decision making level.

The Department of environmental affairs excepts the aviation industry to pay taxes as well as SARS. This tax should be paid back into the aviation sector and not into the coffers pockets.