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EGNOS in Africa - JPO

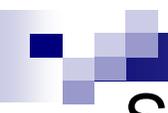
Benefit Analysis for SBAS in Eastern Africa
GNSS Workshop
Rabat, 7-8 November 2017

Sémou Diouf (JPO) & Daniel Ludwig (DLC)
supported by Thiago Tavares (VVA)



Outline

- From SBAS in AFRICA to SBAS in Eastern Africa
- Benefit Analysis, outcomes
- Benefits for Somalia and Sudan
- Conclusion



SBAS in Africa initiative 1/2

continental coordination / regional implementation

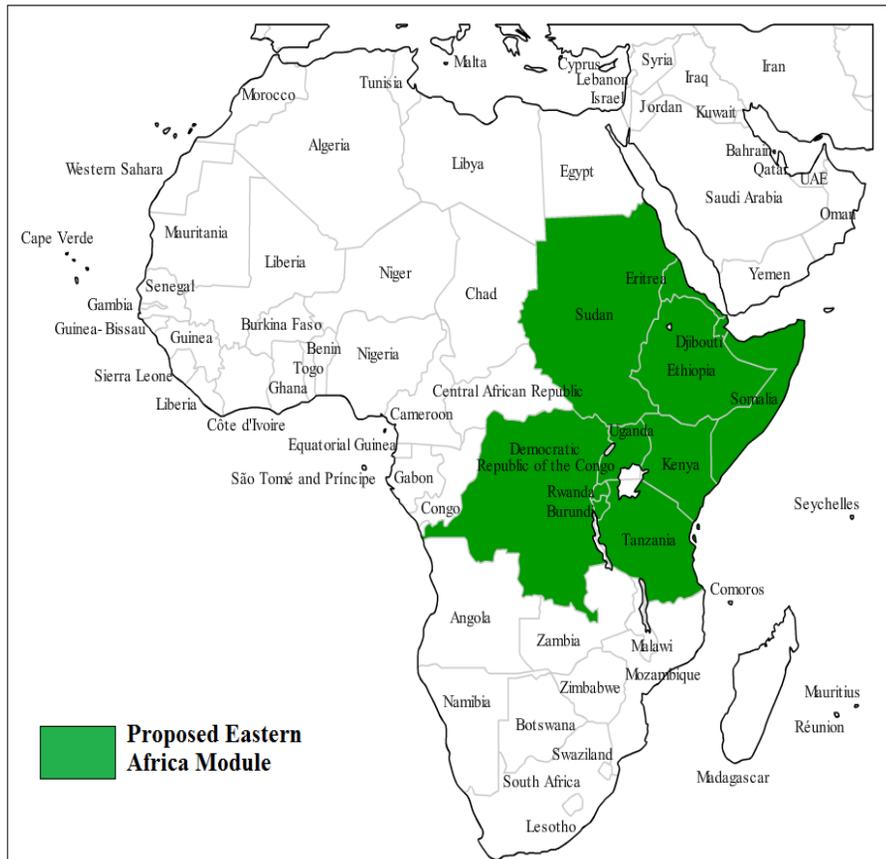
- Africa-UE political High level decision (Windhoek 2009) on the introduction of satellite navigation based on EGNOS to enhance safety in Civil Aviation, proposed a continental approach;
- Several Africa-EU Summits (Tripoli 2010, Brussels 2014) gave impulse to the development of regional initiatives of African States (ASECNA, ACAC, South Africa, etc.);
- A single Pan-African EGNOS SBAS System (starting from sub-Sahara) remains the long term objective through the consolidation of the regional modules. North Africa will be covered by the EU EGNOS extension.
- *Consideration of African Space Policy and Strategy as adopted by AU Summit in 2016 and proposed creation of an African Space Agency with Satellite Navigation and Positioning*
- *Declaration of the first Session of the AU multi-Sectorial STC in March 13-17 in Lomé to conduct a continental CBA and strategy for Africa*

SBAS in Africa initiative 2/2

Continental coordination / Regional implementation

- Creation by the EU of the **Programme management Office (JPO)** who developed and proposed a modular evolutive implementation approach based on regional economic communities (RECs);
 - JPO « mandated “ in the Second Action Plan of the Joint Africa-EU partnership, in the field of satellite navigation to coordinate the implementation of SBAS/ EGNOS in Africa with aviation as main driver.
 - Multidisciplinary Team of African experts (technical, institutional, economic) with a financing now through PanAfrican Fund (PanAf)- Action Plan for preliminary studies with RECs (EAC, ECCAS, IGAD,) and aviation organisations such as AFCAC,
- **On-going SBAS Programme in the ASECNA region:**
 - Decision of 17 Member States since 2011 to participate in a programme **based on EGNOS**, following the Tripoli Summit, Participation to preliminary technical studies and capacity building in Africa (SAGAIE,SAFIR, MAGNIFIC projects);
 - **Signature of an international agreement with EU** in 2016 now under final enforcement
 - **Phase B studies are under development** in cooperation with Industry- Early services foreseen in 2019/2020
 - Scenario envisaged is an autonomous regional system extensible to other Regions

SBAS Eastern Africa in brief



Member States

The proposed Eastern Africa Module consists of:

IGAD Member States

Ethiopia, **Somalia**, Djibouti, Kenya, Eritrea, **Sudan**, South Sudan, Uganda

EAC Member States:

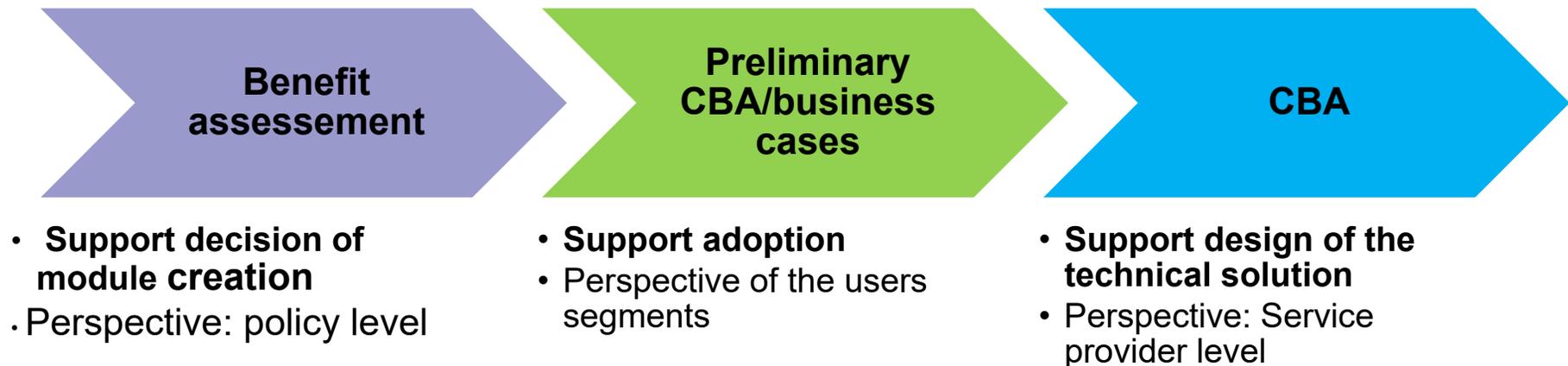
Kenya, Burundi, Tanzania, Rwanda, Uganda, South Sudan

The DR. Congo

ACAC member States: Somalia and Sudan

Why a Benefit Analysis for Eastern Africa

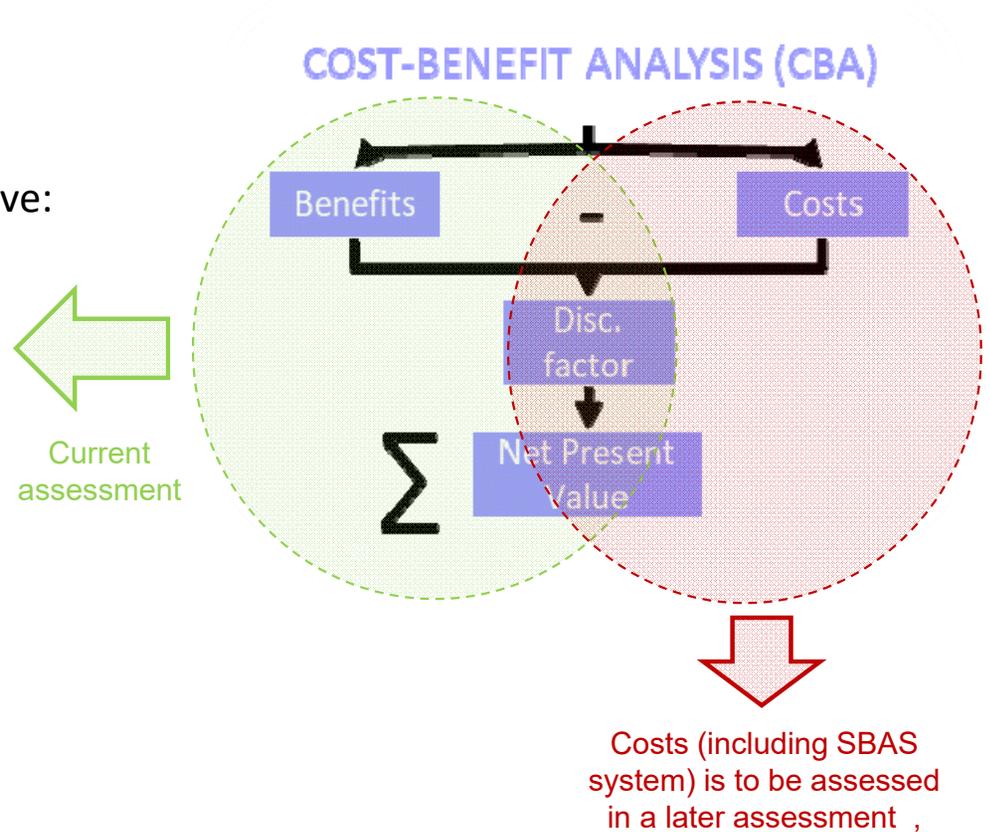
- Recommendation from **APIRG 19** (2013) to conduct impact assessment studies, considering economic, social and environmental impact;
- **Benefit** Analysis to demonstrate the benefits in aviation and other applications and to support a sound preliminary decision of the creation of the module;
- **Cost Benefit** Analysis foreseen as the next step to support the choice of the technical scenario



Benefits of SBAS services in Eastern-Africa 1/2

- Benefit Assessment from the following perspective:

- States and Society (all type of applications)
- ANSPs and Airport operators
- Airlines and Aircraft operators





Benefits of SBAS services in Eastern-Africa 2/2

- Direct and indirect benefits deriving from LPV application (usage of the certified APV-I SBAS service)
- **Benefit Assessment's timing and assumptions:**
 - **Benefit Assessment's timeframe: 2017 – 2050**
 - System capability for other domains/early services: mid 2024
 - System operational for aviation (including certification): end 2025
 - 100% penetration of SBAS procedures on international airports by 2029
 - 100% penetration of SBAS procedures on domestic airports by 2037
 - Air traffic growth of 5% per year
- **Interactions with RECs** have started and will continue(EAC-IGAD ...)

Eastern African Module in Figures



12 countries



Area

9 Million km²



Population

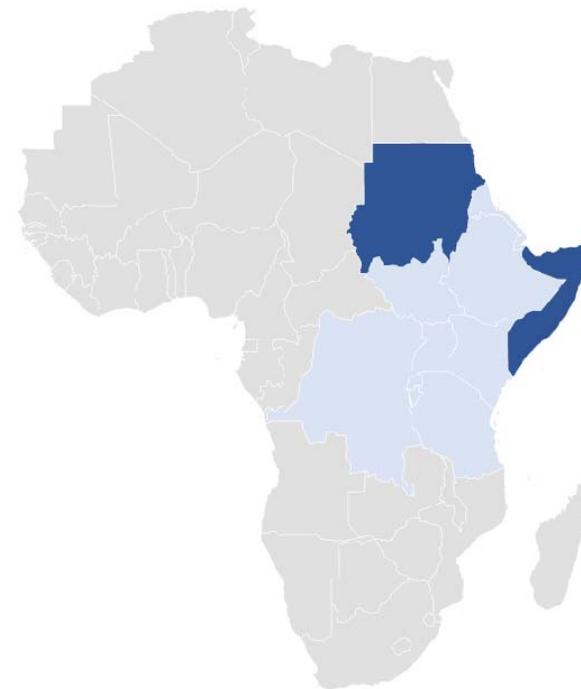
421 Million inhabitants



GDP

USD about 369 Million

Module 3: Eastern Africa



● 2 ACAC countries
Somalia
Sudan

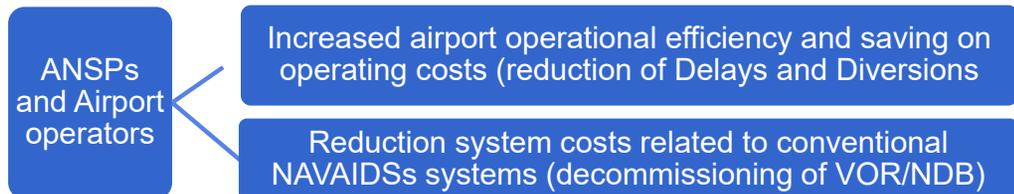
● 9 other countries
Burundi
DRC
Djibouti
Eritrea
Ethiopia
Kenya
Rwanda
South Sudan
Tanzania
Uganda

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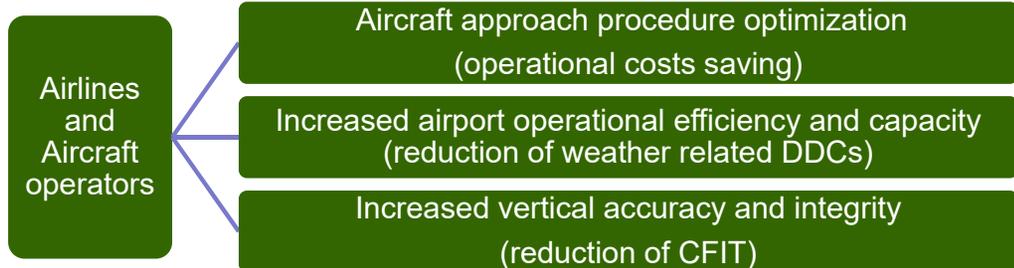
Provisional results for the Aviation sector: Eastern Africa

Total Present Value (2017 – 2050)*
Discounted values for 2017 (@4.7% per year)

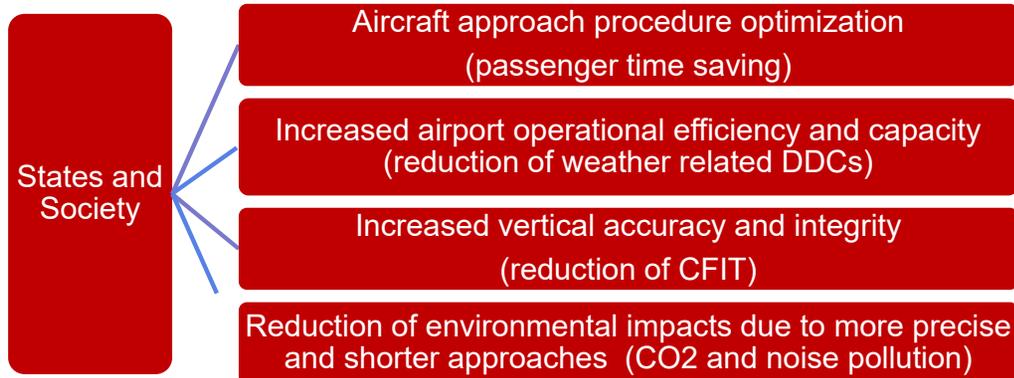
EUR ~804 Million



EUR 5 Million



EUR 542 Million



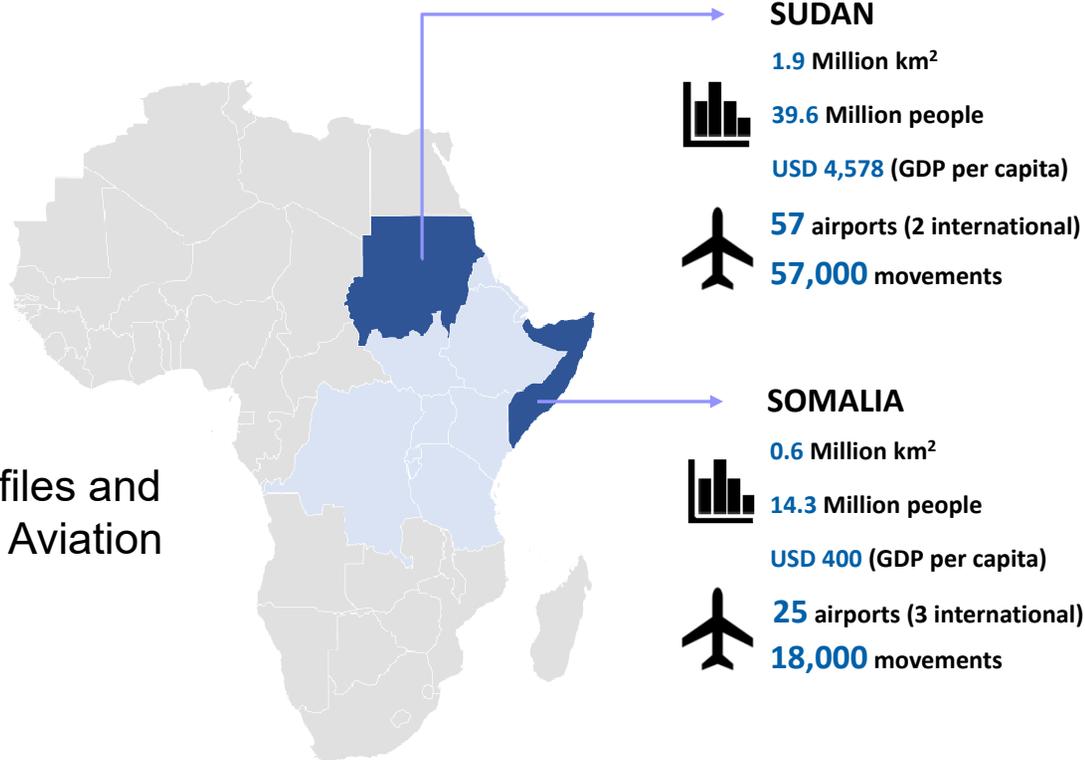
EUR 257 Million



*only provisional results

Benefits for the Aviation sector in Somalia and Sudan(1)

Country Profiles and Potential for Aviation



Benefits for the Aviation sector in Somalia and Sudan(2)

- Increased airport operational efficiency and saving on operating costs on non-ILS airports (reduction of weather related Delays, Diversions and Cancellations)
 - It is estimated that **94%** of the airports (Somalia + Sudan) **are not equipped with ILS**
- Reduction system costs related to conventional NAVAIDSs systems - decommissioning of VOR/NDB
 - Decommissioning of **6 NDBs** (period: 2026 – 2040)
 - Decommissioning of **22 VORs** (period: 2026 – 2035)
- Aircraft approach procedure optimization due to SBAS
 - **20% reduction** in the aircraft approach time
- Increased vertical accuracy and integrity (reduction of CFIT)
 - **1 CFIT with fatalities and hull loss** registered in Somalia since 2000
- Reduction of environmental impacts due to more precise and shorter approaches - CO2 emissions and noise pollution
 - **10% reduction** CO2 emissions

Benefits for Non-Aviation sectors in Somalia and Sudan

POTENTIAL BENEFITS OF SBAS FOR AGRICULTURE

CROPS



Allows use in precision agriculture, pass-to-pass accuracy of 20 cm

Reduce waste and over-application of fertilisers and herbicide

Reduced seed consumption, fuel savings and time savings

IN FIGURES

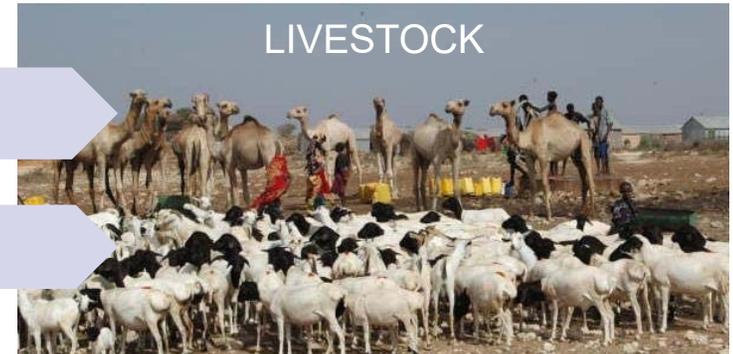


Cost and impacts of SBAS will be assessed to ensure the net impact of SBAS in the sector

Livestock tracking

Virtual fencing

LIVESTOCK



Benefits for Non-Aviation sectors in Somalia and Sudan



POTENTIAL BENEFITS OF SBAS FOR MARITIME

Increase capacity on port approach and harbour environments

Increase safety on port approach and harbour environments



IN FIGURES

SOMALIA
2 MAJOR PORTS

SUDAN
1 MAJOR PORT

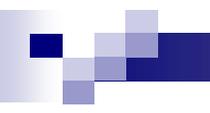
4,068 km
OF INLAND
WATERWAYS

Increase capacity of inland waterways

Improved traffic control of inland waterways navigation

Improved enforcement and security of inland waterways navigation





Conclusion 1/2 - Benefits analysis, next steps

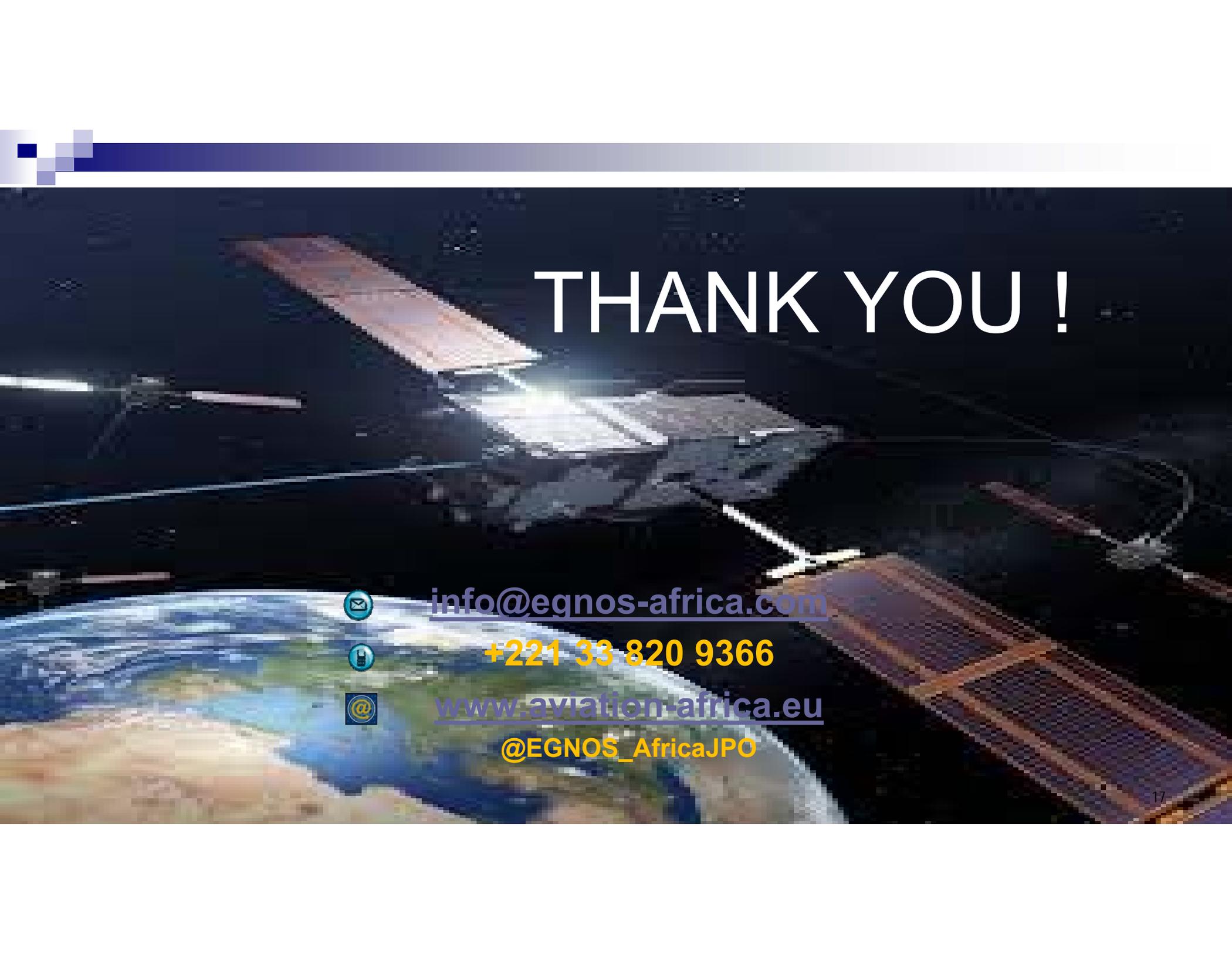
- **Benefits** of SBAS can be computed while **CBA** requires element on costs (CAPEX and OPEX) that are not yet available (system costs) or were not yet communicated (airlines information)
- A preliminary assessment of **benefits has been done in aviation** and the outcomes will be consolidated
- The **non-aviation sectors** have been addressed at the **qualitative** level and case studies will be developed at a later stage to undertake quantitative assessments
- Preliminary structure of OPEX and CAPEX of the module will be proposed later by the JPO based on feasible technical scenarios
- Other evaluations are foreseen in support of users adoption (airlines, airports ANSPs, etc.)

Conclusion 2/2

East Africa Benefit Analysis, a case study for B.A. in Africa

- Benefit analysis accomplished is in line with the **ICAO recommendations on impact assessments*** for the implementation of GNSS systems
- Similar studies have been conducted to evaluate the benefits of GNSS systems at Regional level and Continental level (IATA benefit assessment of air transport in 2016)
- The lessons learnt for **Eastern Africa** will be useful in developing further guidelines for the implementation of other economic studies in Africa in the future;
- Quality of data collection is key, hence call for support by States on this issue

*Recommendations 18/33 & 19/29 debated during ICAO APIRG 18,19,20; ICAO circular 292 & circular 257 & ICAO Multi-sectorial ASBU working group report 2015



THANK YOU !



info@egnos-africa.com



+221 33 820 9366



www.aviation-africa.eu

@EGNOS_AfricaJPO