

CANSO AFRICA CONFERENCE 2022

Dakar, Senegal

5 – 9 September 2022

Host:



WELCOME



Simon Hocquard

Director General

CANSO

THANK YOU

TO OUR SPONSORS



THANK YOU

TO OUR EXHIBITORS





THANK YOU
TO OUR NETWORKING BREAK
SPONSOR

UNICEF: INTRODUCING THE AFRICAN DRONE AND DATA ACADEMY (ADDA)

PRESENTERS



Michael Scheibenreif

Regional African Drone & Data Academy Manager
UNICEF



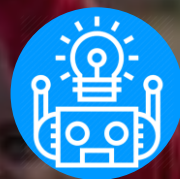
Keren Asaba

Drone Flight Operator
TOA Custodian Nigerian Ltd



AFRICAN DRONE & DATA ACADEMY

training pilots for safe airspace



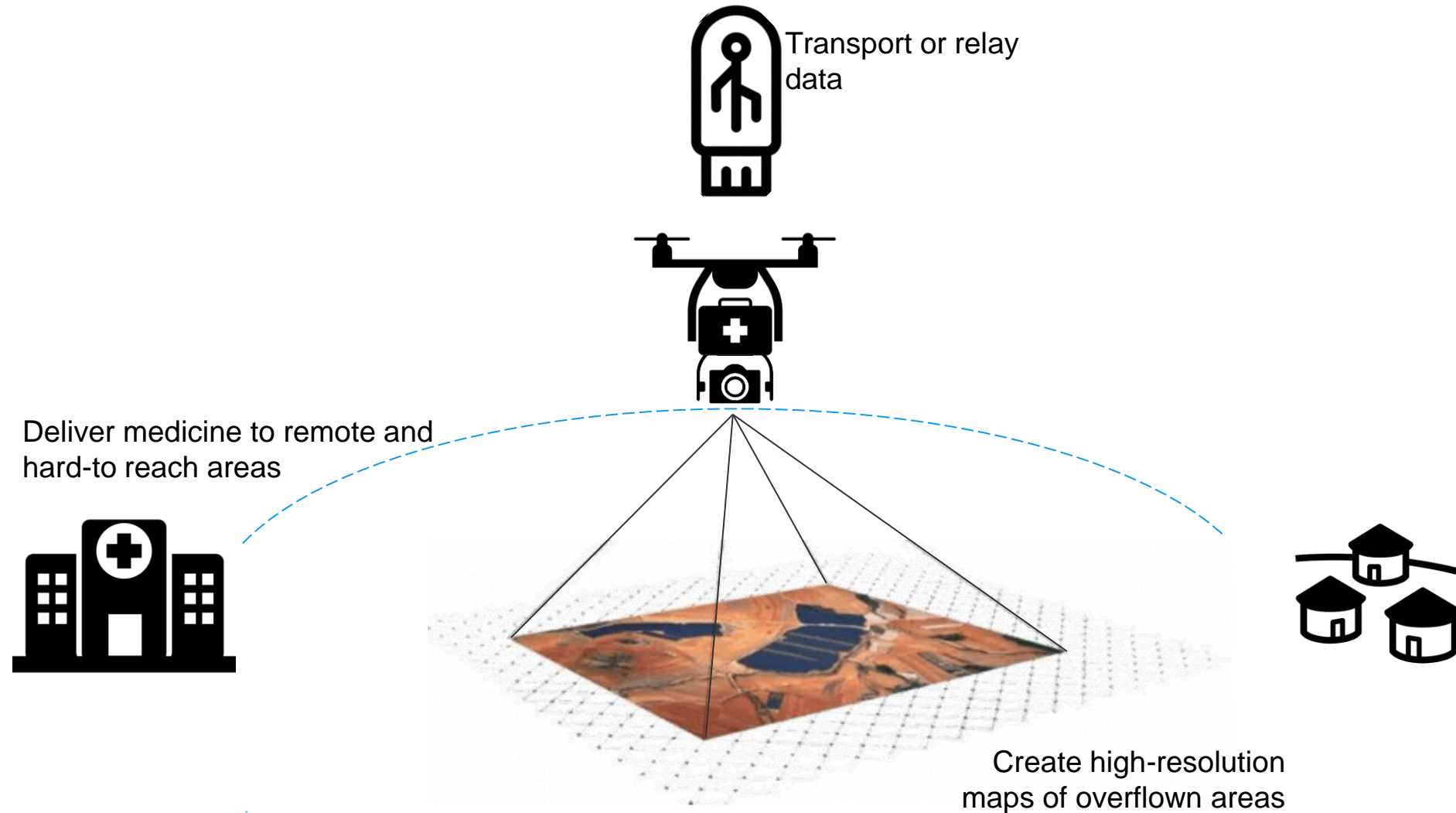
TEACHING GEO-SPATIAL ANALYSIS and DRONES for 21st CENTURY SKILLS

07/09/2022

Dr. Michael Scheibenreif | mscheibenreif@unicef.org
Chief Pilot, Keren Asaba



Drones are tools to:



Transport



Transport – 3 hubs



- 428 flights
- covering over 19,750 km,
- majority VL samples & test results

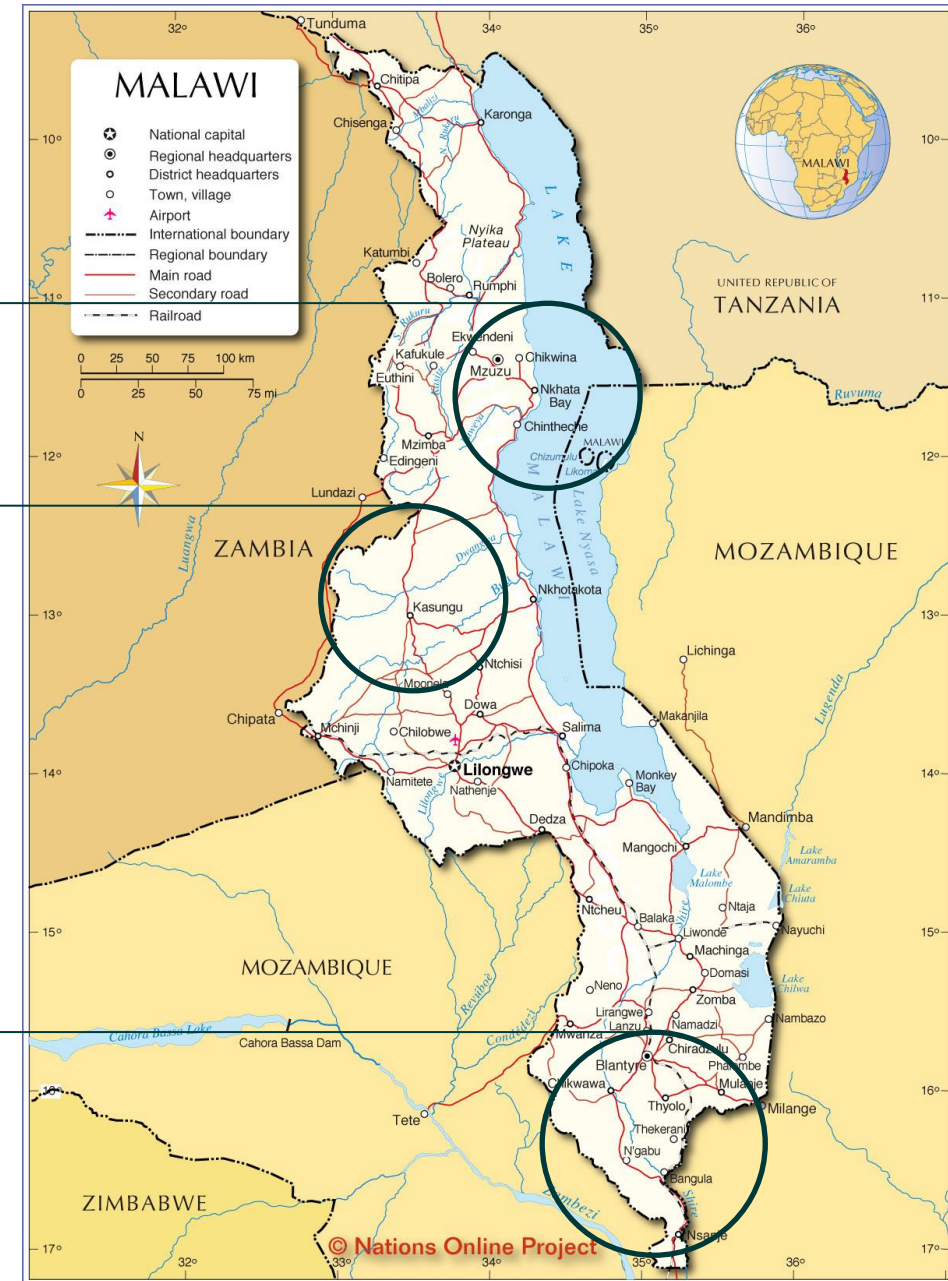
(ended 01/2020)



- Over 1166 delivery flights
 - Over 1600 kg delivered
 - More than 60,000 km flown
- In 3 operational drone hubs -
Lifesaving medical treatments
such as a neonatal suction tube
to clear the airway of a newborn
baby



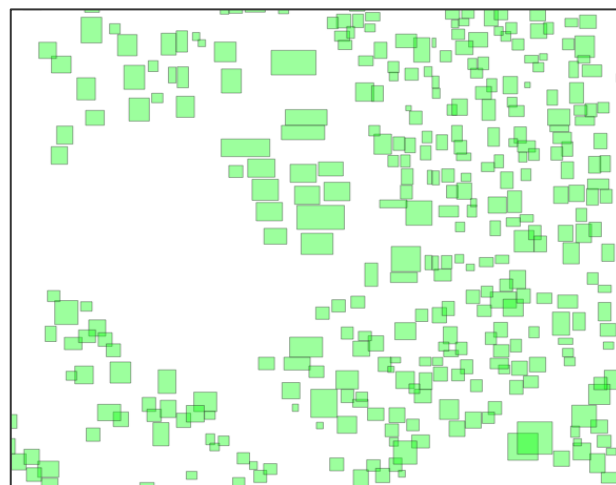
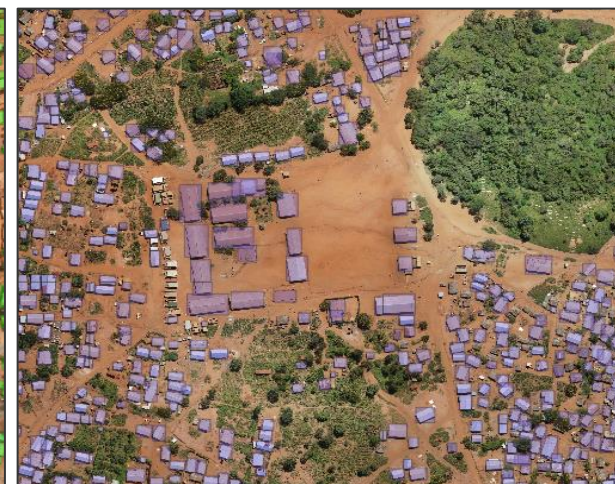
- 1,808 flights,
 - Incl 12,475 doses of vaccines
 - 34 emergency flights
- (ended 10/2020 restarted as a
village reach project)



Intro: Using AI for image classification

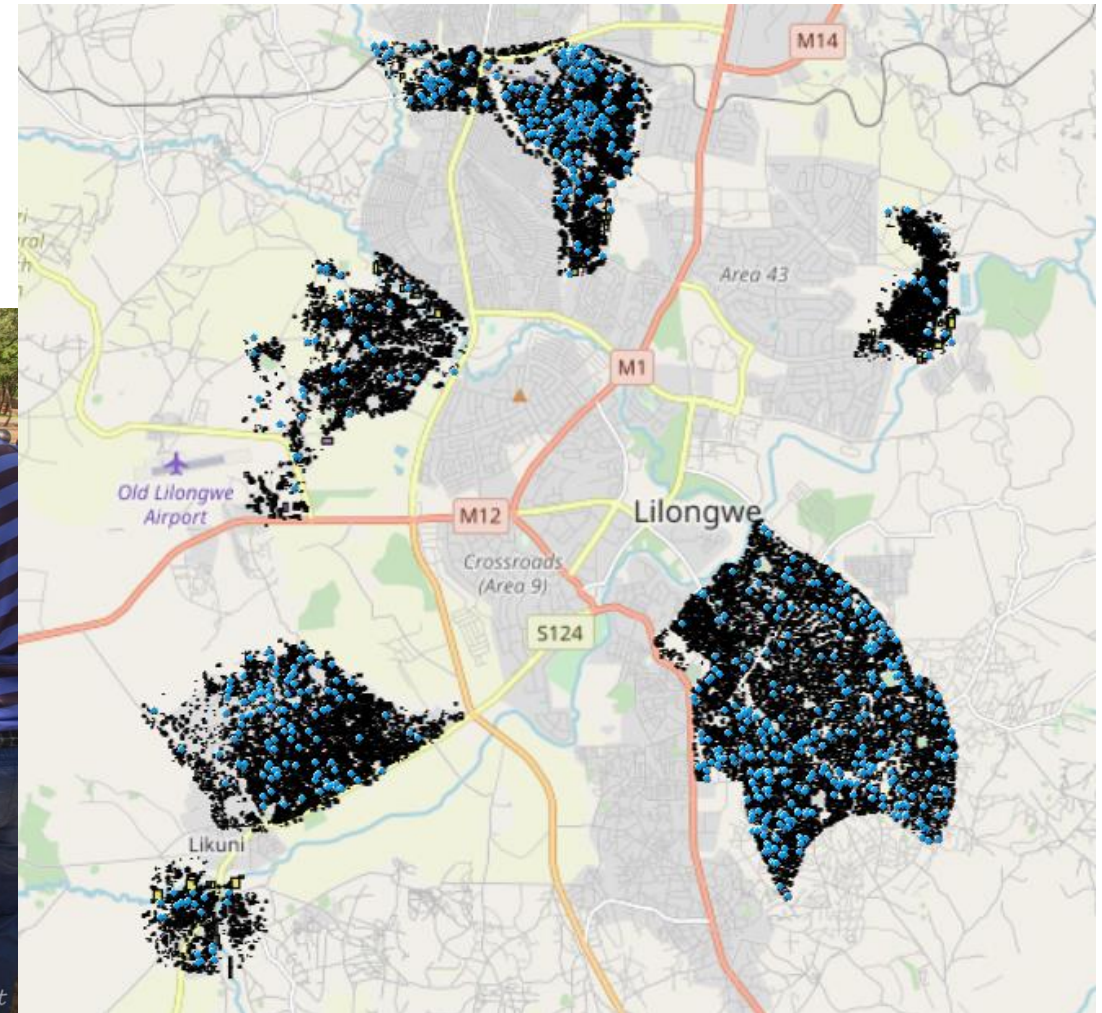
Drone collected aerial images are processed to become 'orthomosaics' and harvested for data with image recognition tools (Artificial Intelligence, AI) to annotate geo-referenced points of interest

POI	Number of identified points at determined accuracy			
	65% +	75% +	85% +	95% +
Tin roofs	87782	71704	27166	2880
Thatched roofs	5125	3762	1754	1
Latrines	8395	3900	253	-
Ground water	1708	890	281	24
Dumping sites	2991	1294	237	22
Water points	1131	642	71	-



Cholera response

Mapping 54 km² of cholera prone townships in Lilongwe, using data to support community outreach and to advise on WASH infrastructure investments through cholera vulnerability map



Disaster response

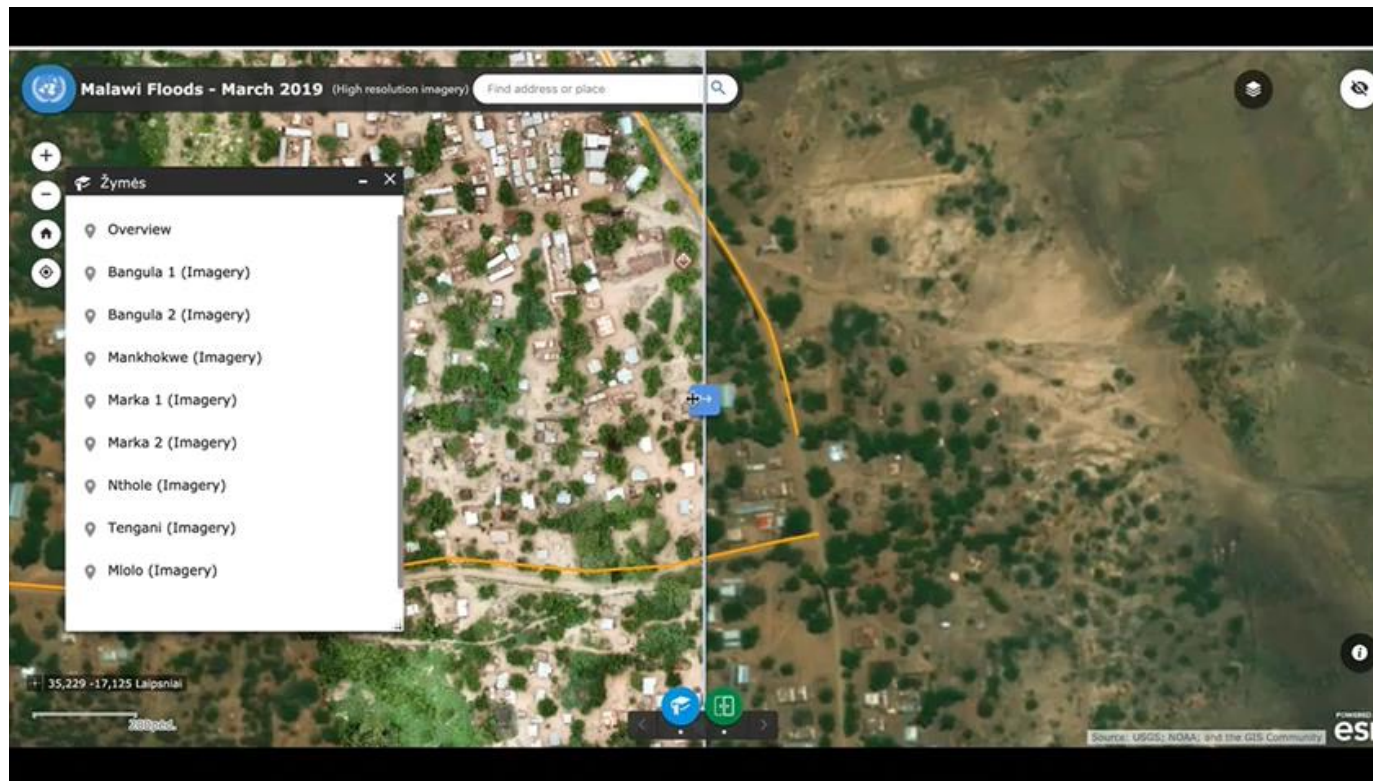
Buildings (112)



Water



Assess Cyclone Idai damage during disaster response, next step: improving flood preparedness with drone imagery



Identify mosquito breeding sites



Malaria vector control: to use drone imagery to support research on link between vegetation and Anopheles mosquitos and to identify stagnant waters for malaria control program



Soil management and crop detection

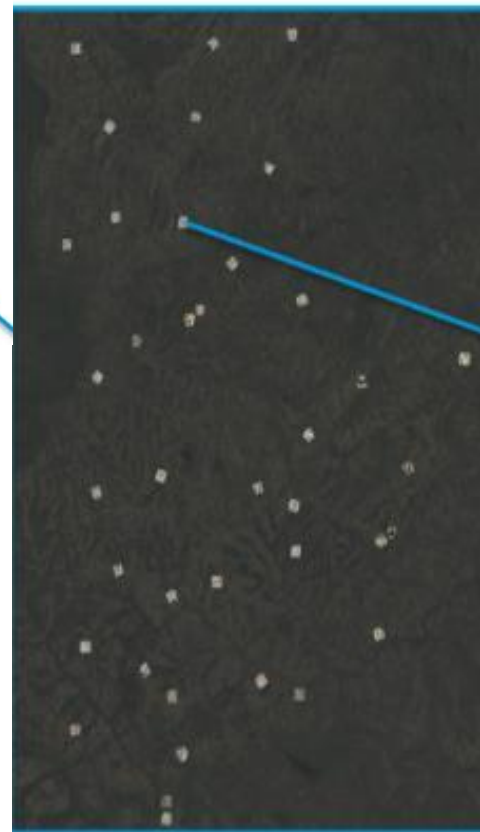
Drone data is analysed to understand the characteristics of local farmland, vegetation including crops and soils

Drone imagery helps to build a crop types classification model for satellite imagery to monitor agriculture area change.

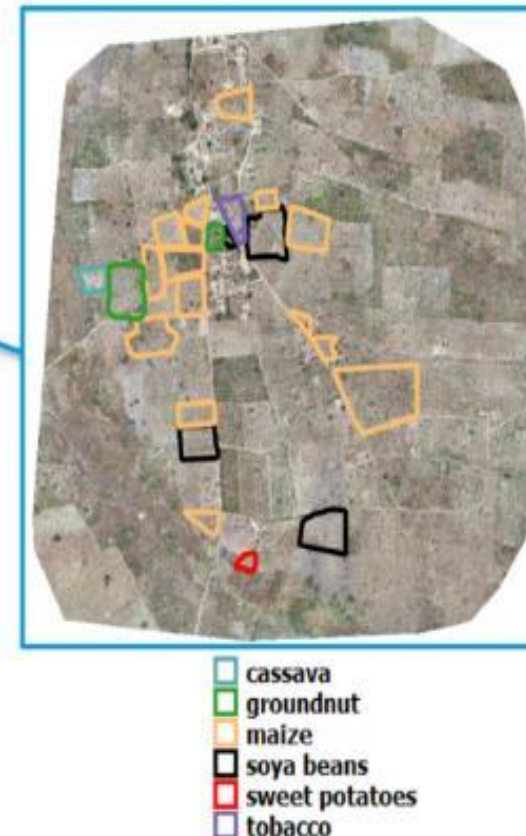
Test site localisation



40 drone mosaics
(4cm spatial resolution, 40100ha in total)



1008 reference agricultural plots
(labelled for crop type and development stage)



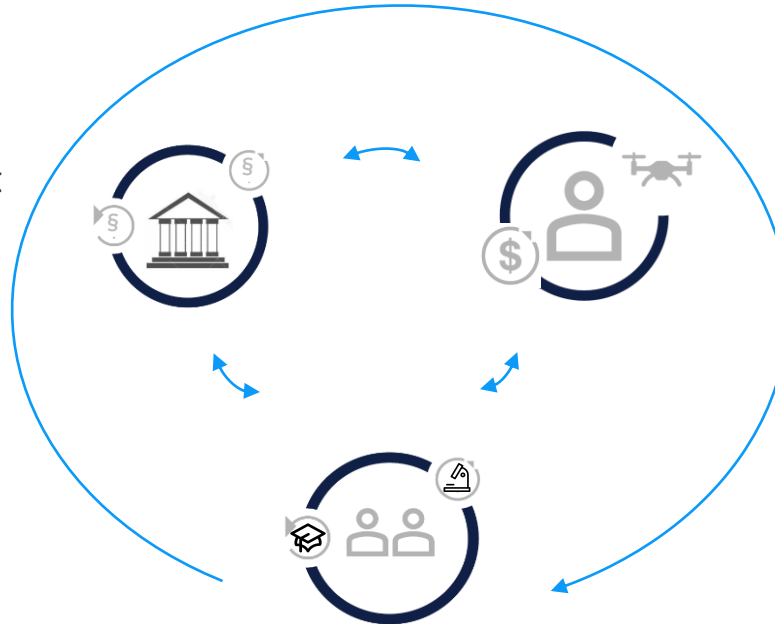
The innovation ecosystem

It is pivotal that innovation does not happen in isolation – restricted to e.g. an accelerator – but touches “every aspect of modern African life – with the legal and governmental infrastructure to support it”

Quartz Africa innovators 2019: leading the change for Africa’s future

1. A Regulatory System ...

Close collaboration with Department of Civil Aviation leading to broad support of drone work and new drone regulation



2. ... to Provide New Services ...

Cargo drones or mapping for AI analysis to allow data driven programming

3. ... with Key Stakeholders!

Building local capacity of drone manufacturers, pilots and data analysts through African Drone & Data Academy

ADDA: institutionalizing regional skill building



**AFRICAN
DRONE & DATA
ACADEMY**

UNICEF understanding of innovation goes beyond the notion of merely piloting and imposing technology advances but to built skills locally

**ADDA opened in January 2020 in
Lilongwe, Malawi**



Blended learning approach to train future service providers & public officials in:

- building, piloting and maintaining drones;
- using drones for transport and image acquisition
- using Artificial Intelligence techniques to harvest data out of the collected geo-referenced imagery

First graduation ceremony in March 2020



- **No tuition fee! Full scholarships for all incl. transport, room & board**
- Students from Malawi and 29 countries in the region
- 60% of the students are female
- **90% of graduates found employment in the sector within 3 months**



Achievements so far

Creation of training curricula:

“Certificate in Drone and Data Technology” CDDT (11w hybrid)

CDDT level 1 – online (5w)

CDDT level 2 – in person (6w)

“Compact” Course (2w hybrid)

Including basic drone knowledge – online (1w)

Remote pilot license, in-person (1w)

Massive Open Online Courses (MOOC)

Remote Pilot Aircraft Technique (RPAT) (1 w)

Data Visualization and Cartography (DVAC) (1 w)



ADDA graduates since establishment:

- 157 (60%) female graduates and 104 40% male graduates from CDDT-1 and 2 level
- 245 graduates from the two one-week massive open online courses
- Overall, over 500 graduates total from 29 African countries



Impressions (1)

During the “Certificate of Drone and Data Technology” (CDDT) training, the students build three different types of drones including a rotor wing “s-500” and a fixed wing “Ecosoar” developed by VTech



Impressions (2)

ADDA graduates mapping Dzaleka refugee camp (close to Lilongwe) to extract data for water-shed management and flood prediction



“3 tiers” approach to ensure sustainability

ADDA integration into a specific local context can happen through “3 tiers” approach, depending on local preferences:

Tier 1 – Pilot license: ADDA to obtain certification as e.g. an Approved Training Organisation (**ATO**) as per Department of Civil Aviation requirement to enable it to issue drone pilot licenses

Tier 2 - TVET: ADDA incorporated into a **technical college** for vocational trainings in accordance with TVET policy

Tier 3 – Degree Program: accreditation of ADDA training as a **Undergrad/Degree programme** which multiple universities can adopt.

Plus: establishing **ADDA incubators** to support transition of graduates into e.g. agropreneurship



Next steps: Scaling and sustainability!

Regional scaling:

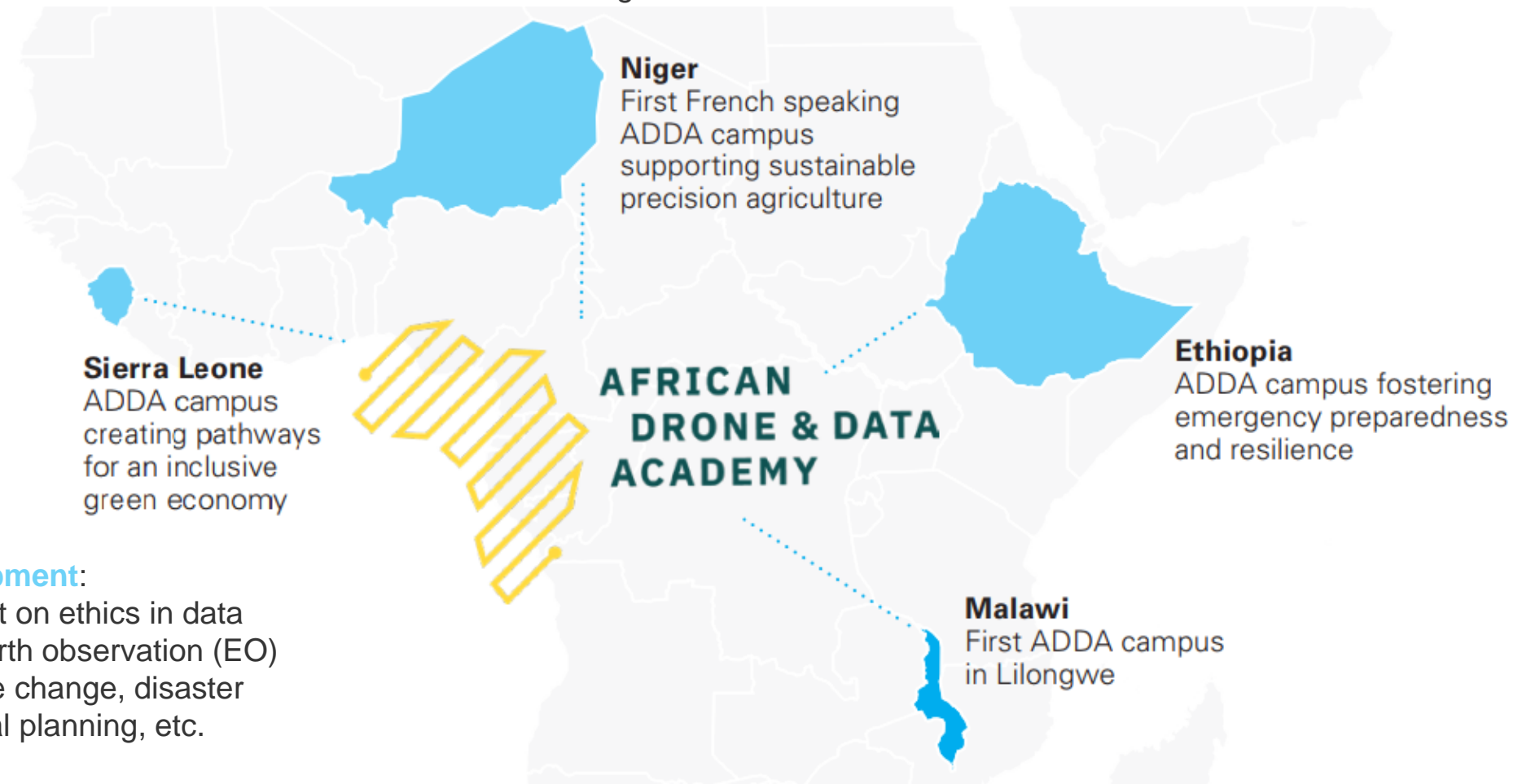
A variety of countries across Africa plus Asia requested the establishment of ADDA campuses

Business case development:

start opening “professional training” program for professionals to respond to need and generate income

Curriculum development:

Creating new content on ethics in data collection, adding earth observation (EO) data to tackle climate change, disaster preparedness, spatial planning, etc.



Learn more?

<https://www.unicef.org/malawi/african-drone-and-data-academy-malawi>



AFRICAN DRONE & DATA ACADEMY

Dr. Michael Scheibenreif
mscheibenreif@unicef.org

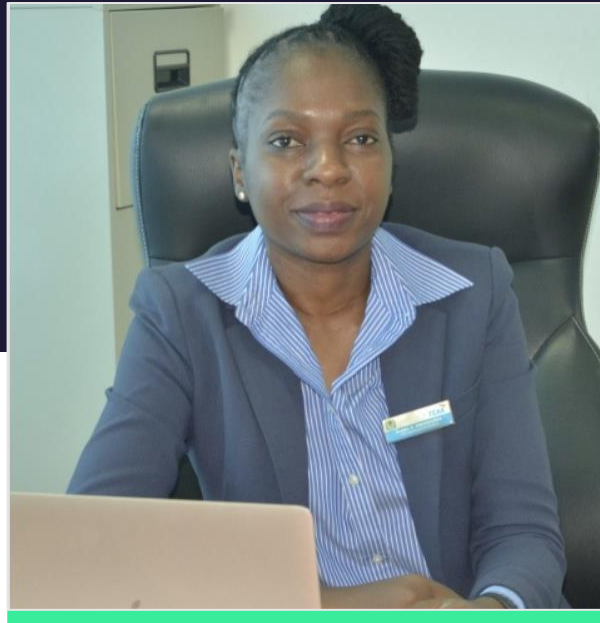
Chief Pilot, Keren Asaba



THANK YOU

THE NEXT GENERATION OF ATM – LEAP-FROGGING TECHNOLOGY IN AFRICA, INFRASTRUCTURE SHARING AND OTHER NEW TRENDS. WHAT ABOUT THE ASBU FRAMEWORK?

FACILITATOR



Flora Mwanshinga

Director Air Navigation Service
Tanzania Civil Aviation Authority

PRESENTER



Moustapha Boukary Malam

Head Systems & Services

SatNav Africa JPO

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SBAS a Leap-frogging Technology in Aviation

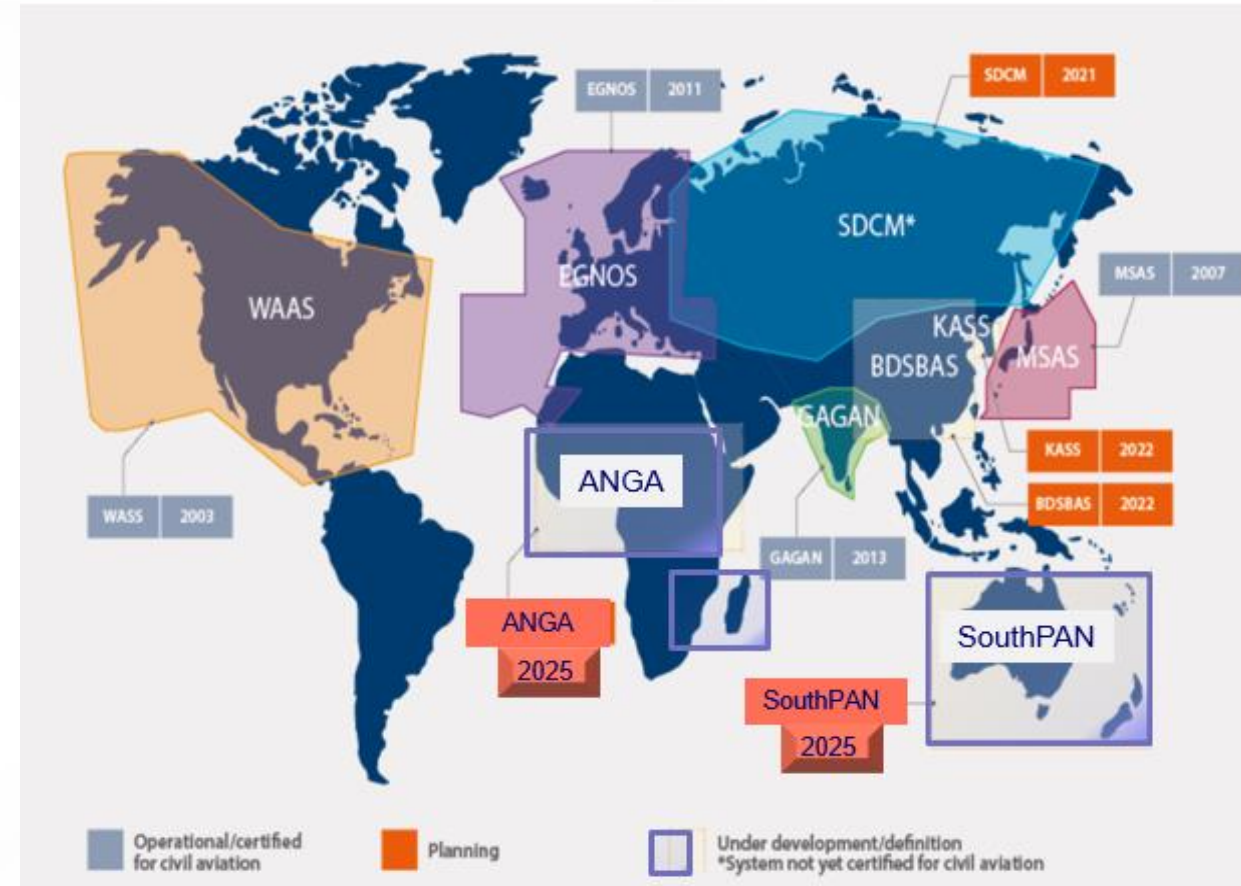
‘The Next Generation of ATM - Leap-frogging Technology in Africa, Infrastructure Sharing and other New Trends. What about the ASBU Framework ?’

SatNav Africa JPO

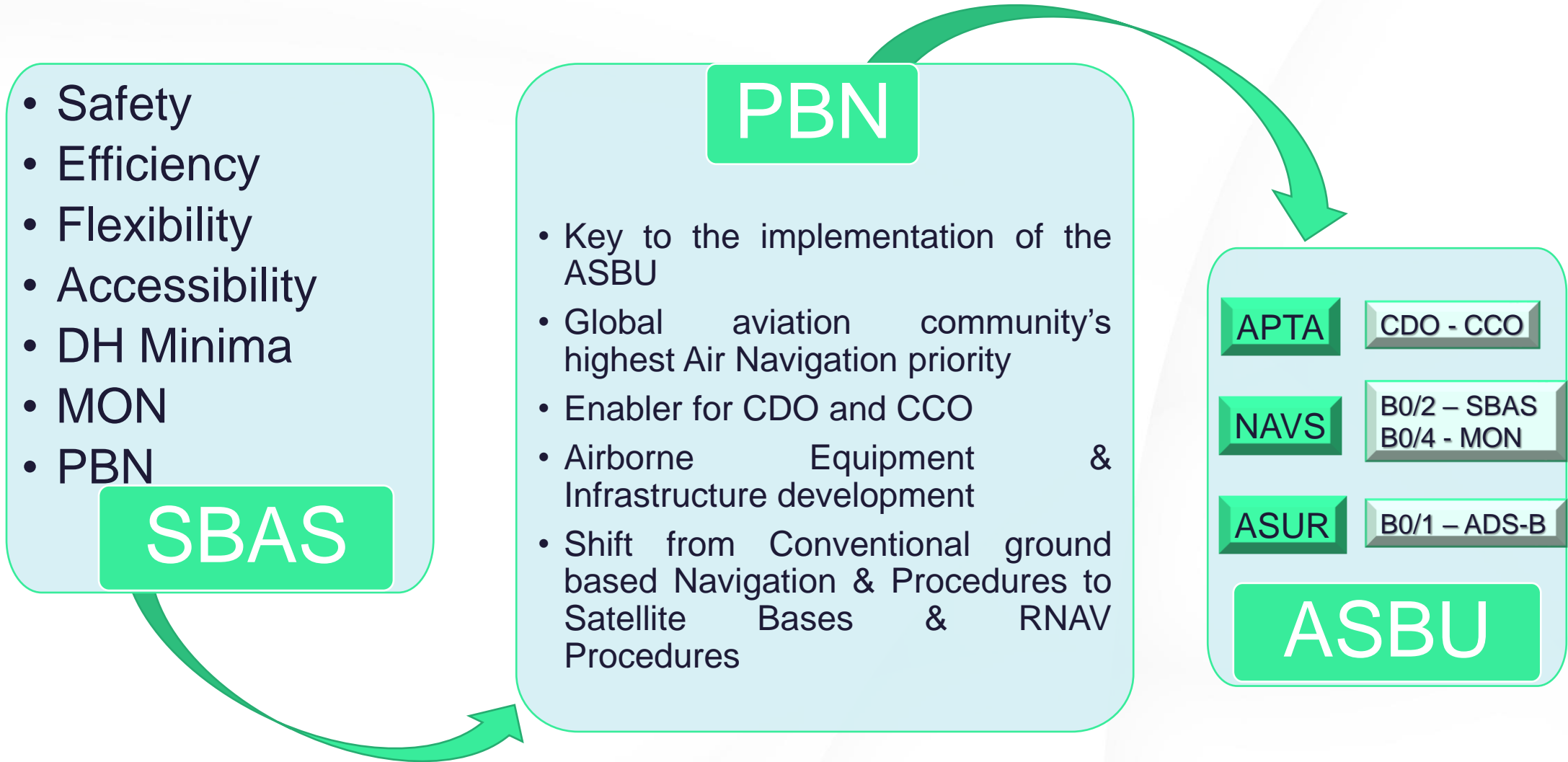
Moustapha BOUKARY MALAM

SBAS a Leap-frogging Technology in Aviation

- ❑ System based on geostationary satellites and accompanying ground stations used for the augmentation of core constellation signals.
- ❑ Several SBASs are developed or under development globally.
- ❑ Technical interoperability thus supports seamless transition in SBAS service areas.
- ❑ SBAS meets ICAO performance criteria for GNSS Navigation elements:
 - ❑ **Accuracy**
 - ❑ **Integrity**
 - ❑ **Service continuity**
 - ❑ **Availability**



Why SBAS ?



Why SBAS ?

SBAS

PBN enabler

Key for the
implementation
of ASBU

Improves safety, operating returns, airspace capacity,.

Economic attractiveness for the continent in support to decision-making process and to the update of the AFI GNSS strategy

AUC STC/TIET – Lomé 2017 in line with APIRG - 22/39, tasked AUC to conduct a continental CBA study on SBAS implementation in Africa, considering existing initiatives

SBAS paves way to achievement of your highest Air Navigation priority.

Why SBAS ?

Positive outcomes of the continental CBA on SBAS implementation in Africa

Airlines: the SBAS business case is highly profitable and attractive, with positive values in all the evaluated financial indicators

ANSPs, Airport operators and SBAS service provider: positive business case

Socioeconomic impact monetised and considered in CBA, Environmentally friendly thanks to the positive carbon footprint

SBAS support to PBN only comes with its implementation

Who is SatNav Africa JPO



An outcome of Africa-EU cooperation on satellite navigation (2013)



European Union

Mission Statement & Governance

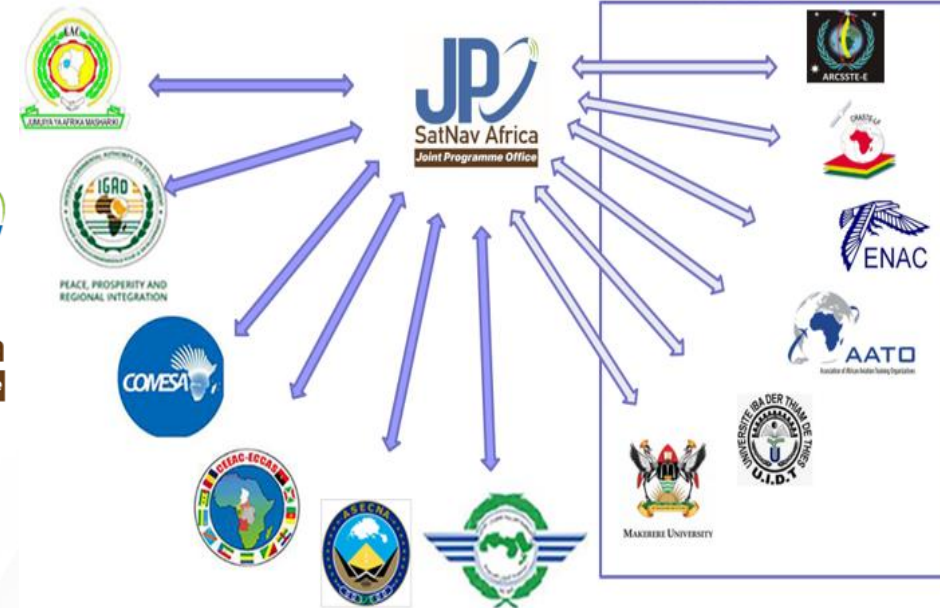
To coordinate and support the development of satellite navigation in key sectors in Africa, with aviation as the main driver.

- Steering Committee Co-Chairs: **AUC, EC**
- Main beneficiaries
 - **African Union & technical organisations** (AFCAC, African Space family)
 - **Regional Economic Communities**
 - **Air Transport users communities** (ICAO, CAAs, ANSPs, Airports, Airlines)
 - **Other sectoral organisations**
 - **Capacity building & innovation frameworks Space Agencies**
 - **other**



12 working arrangements in force

50%



1 Signing in progress



SatNav Africa JPO : Objectives and Business lines

General Objective

Contribute to the **development of satellite navigation in Africa in key sectors**, with aviation as the main lever

Specific Objective

Consolidate the **development of SBAS**, as well as the **adoption and use of GNSS services in Africa**.

Systems & services

Technical support and capacity building to accelerate the development of regional SBAS modules and the integration of SBAS into continental policies and planning

Markets & adoption

Support for the adoption and **use of GNSS services and the development of associated applications and markets in Africa**

SatNav Africa JPO : Typical realization



Policy

Support to Africa-EU cooperation frameworks on SBAS



Support to national, regional & international planning mechanism on SBAS



Advocacy for GNSS SBAS in Africa and global planning mechanisms



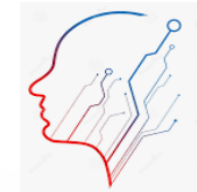
Community

Institutional

Regional SBAS modules concepts



Concepts on legal and institutional aspects of GNSS in Africa



Technical

SBAS & GNSS programme management



Programme and projects concepts on GNSS

Standardisation, normalisation



ANGA : Augmented Navigation for Africa



Development Status

- System architecture fully defined
- System preliminary design completed
- Progressive services areas and related performances validated
- System development and qualification plans developed
- Plan of migration towards DFMC completed
- Demonstration provision effective since September 2020
- Next steps:
 - Phases C/D/E1: Development, deployment and entry into service
 - Continuation of demonstration service with fields demos (e.g. in Nigeria)

SatNav Africa JPO : Typical realization



Economic

Market studies on GNSS in Africa covering all Africa regions



CBAs, Business cases, impact assessments for all sectors




Capacity Building

Workshops
Awareness
Training
Roadmap
Masters



SatNav Africa JPO





“The future of air navigation services is focused on a collective industry approach to ensure seamless air navigation service delivery”



THANK YOU



Organiser: **CANSO**

Host:



PRESENTER



Matthias Gerlich

ATM Networks Expert and Senior Sales Director, ATM Civil
FREQUENTIS AG

FREQUENTIS
FOR A SAFER WORLD

ADDRESSING THE FUTURE – GROWING TOGETHER

7th September 2022



Air Traffic Management

Digital.
Sustainable.
Safe.

+ more

25,000+

Working
positions
worldwide

330+



Customers

95%

of all
passengers
worldwide
supported by
Frequentis

130+

Countries

FROST & SULLIVAN

Recognised as tier 1
ATM leader

+ more

Digitalisation

Virtualisation

Integration

Automation

Air navigation
service providers



Flight
information
service providers



Aeronautical
data service
providers



Airports



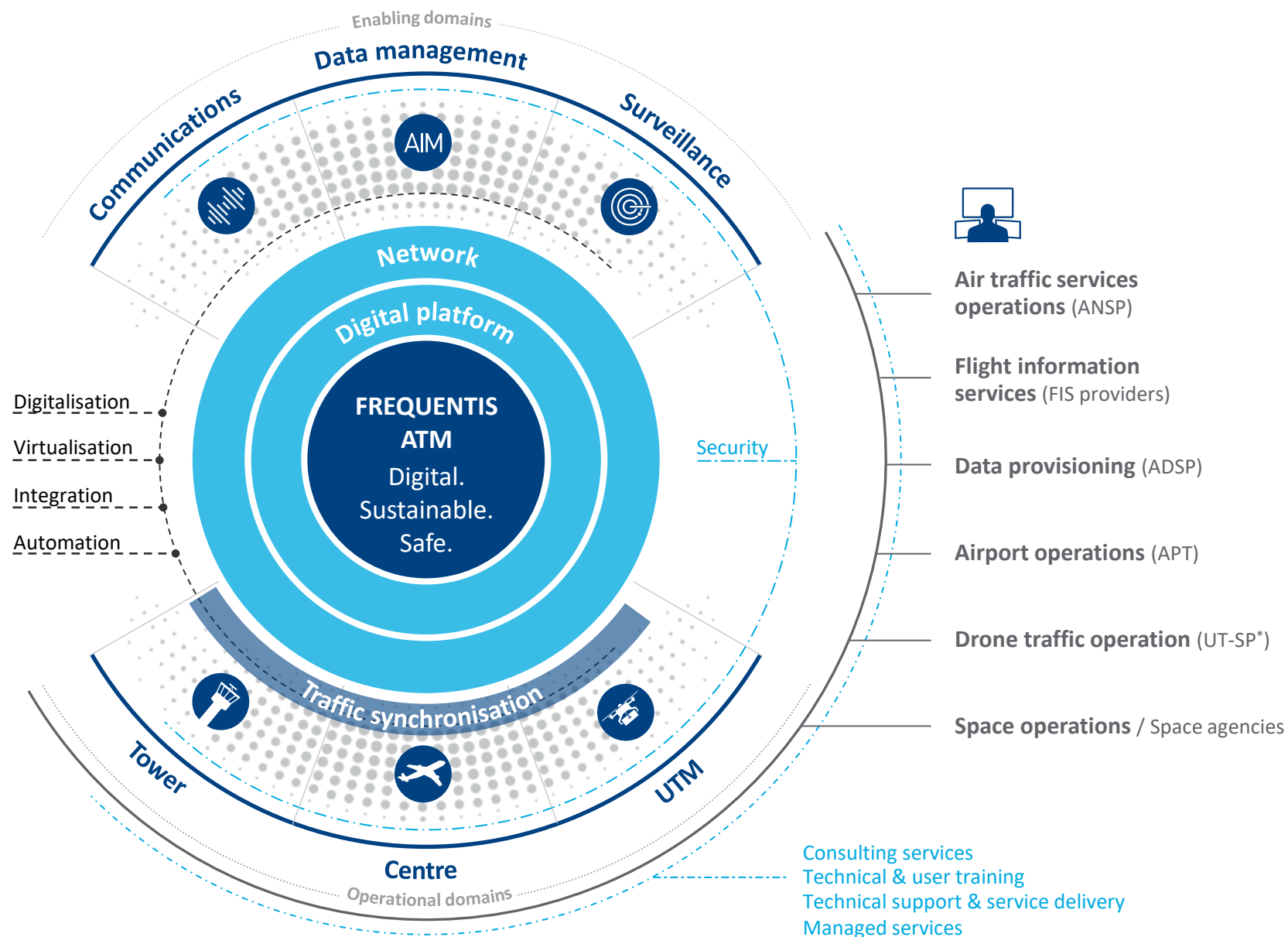
Unmanned traffic
service providers



Space
agencies

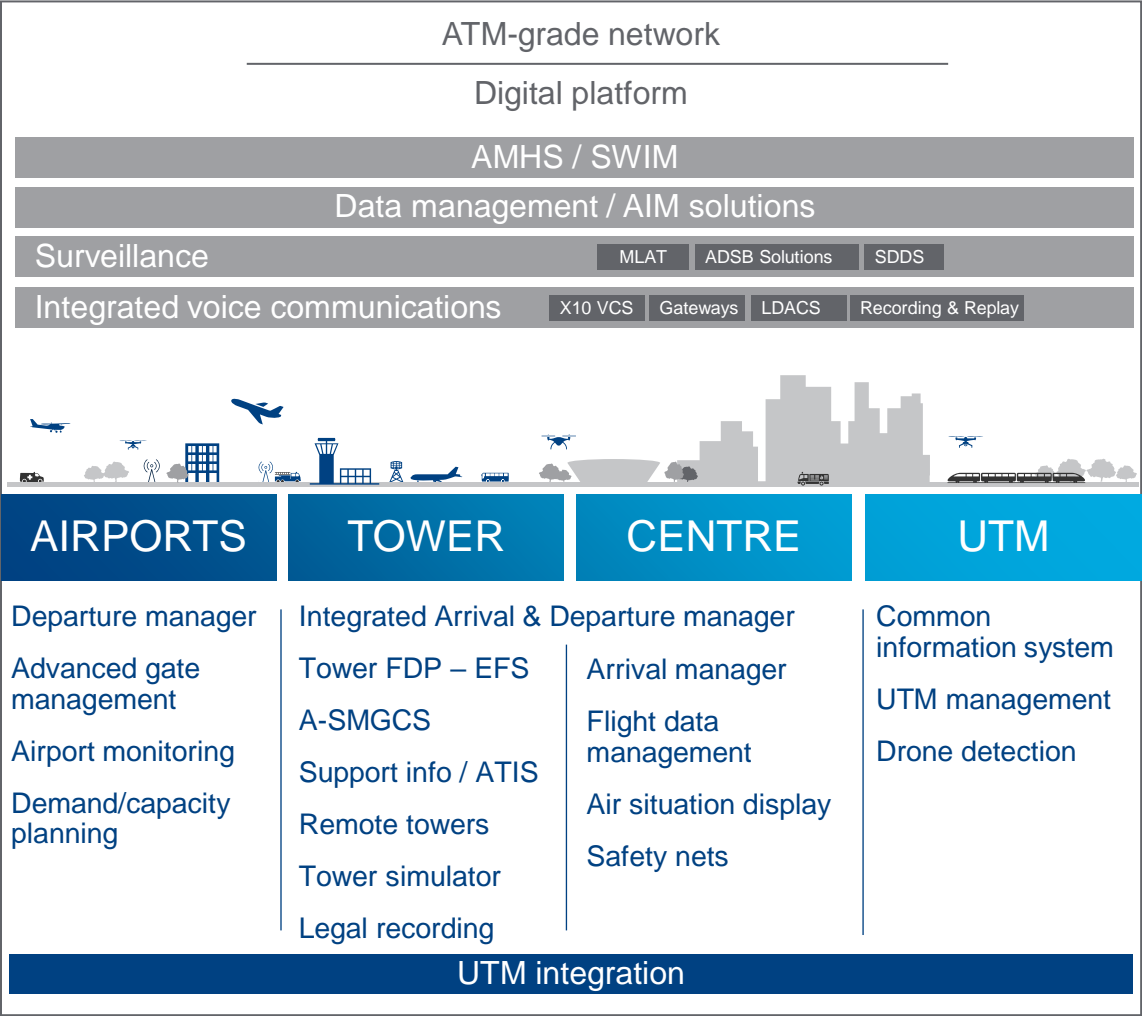
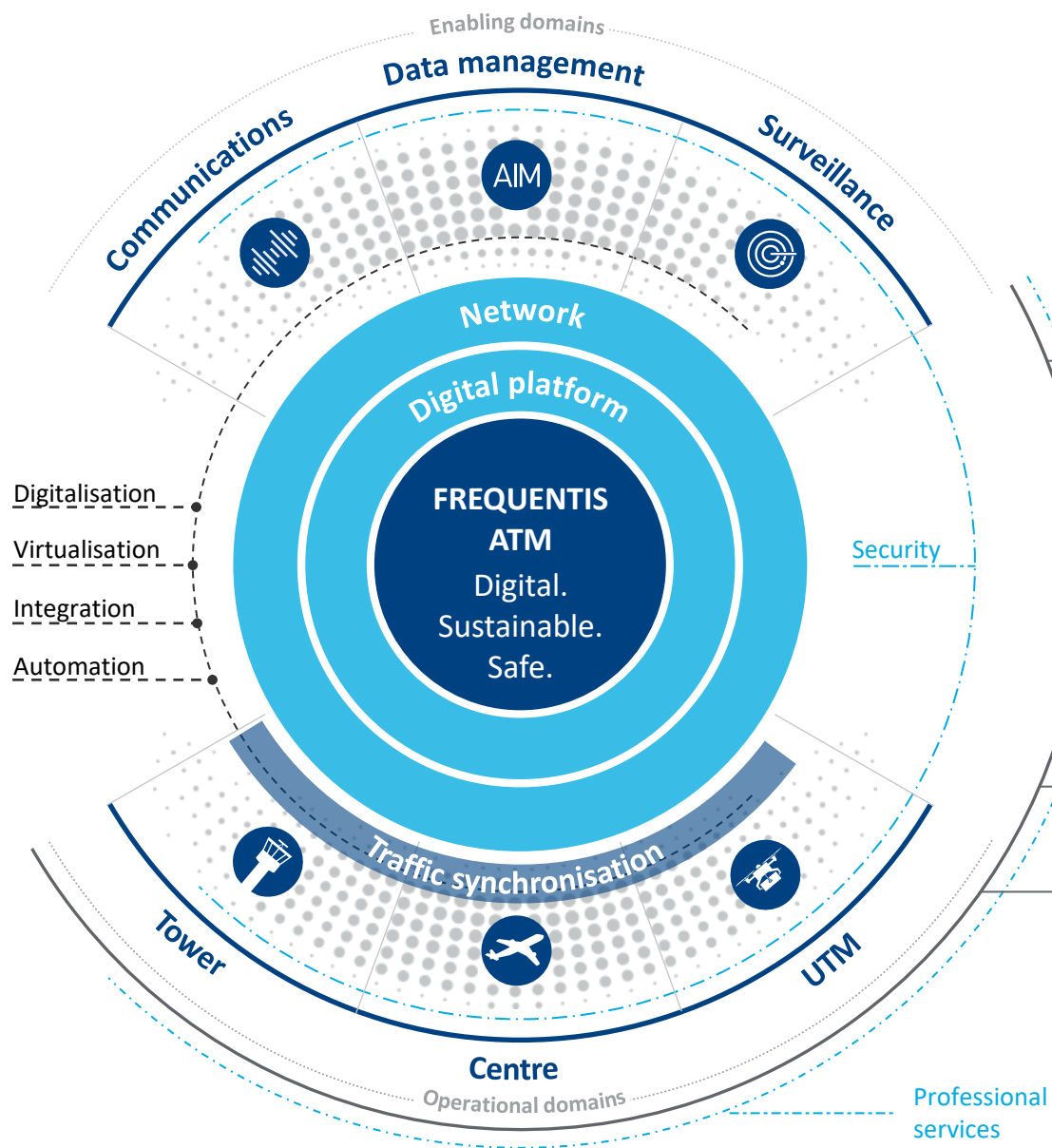


Air traffic management solutions for a safer world



*) Unmanned traffic service providers

FREQUENTIS ATM ecosystem



ADRESSING THE FUTURE – GROWING TOGETHER

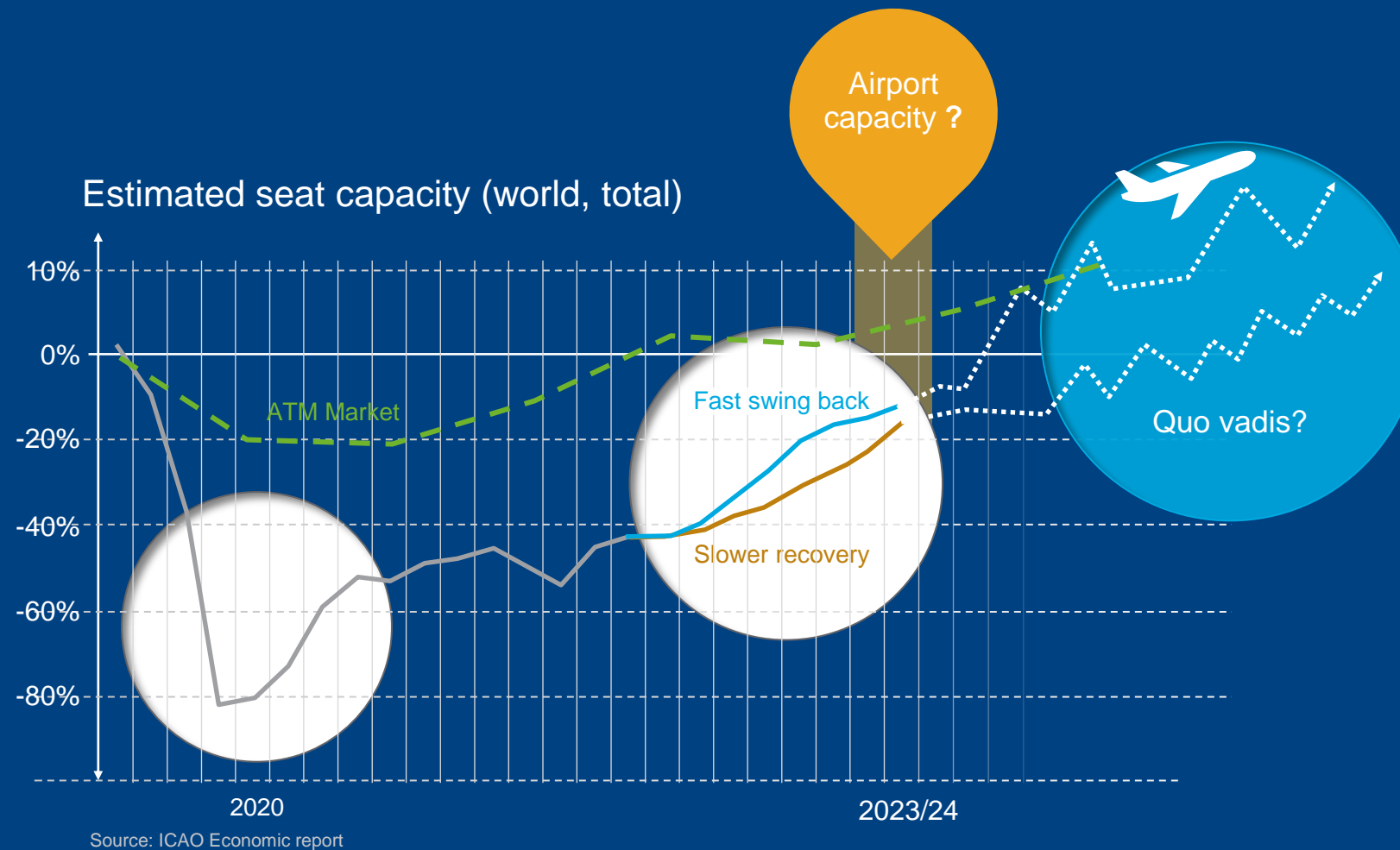
The aviation market shows signs of recovery

The open ATM ecosystem transforms the playbook

Automation and AI are in the core of our investments

One ATM is the new powerhouse of Frequentis

Trends and insights



UTM/ATM integration

Slower progress during pandemic, now picking up.

Strongly driven in Europe.

Automation in towers

Currently less activity due to capacity not being the top issue, expected to be a major topic again from 2023.

Driven in several regions (EU, NA, ME, APAC)

Cyber security

Importance has increased even more due to geopolitical situation.

Worldwide trend.

The big picture – constant megatrends prevail

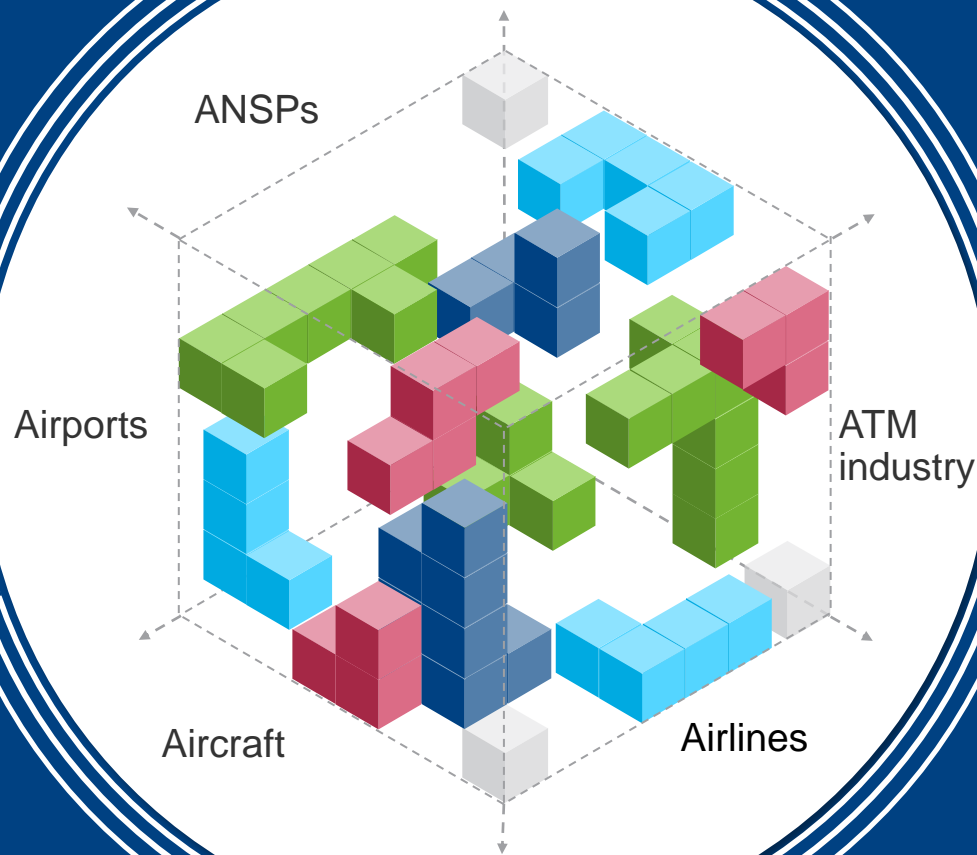


The new ATM playbook: An open ATM ecosystem

Dynamic

Reactive

Agile



Learn
Collaborate
Grow together



European ATM
Masterplan



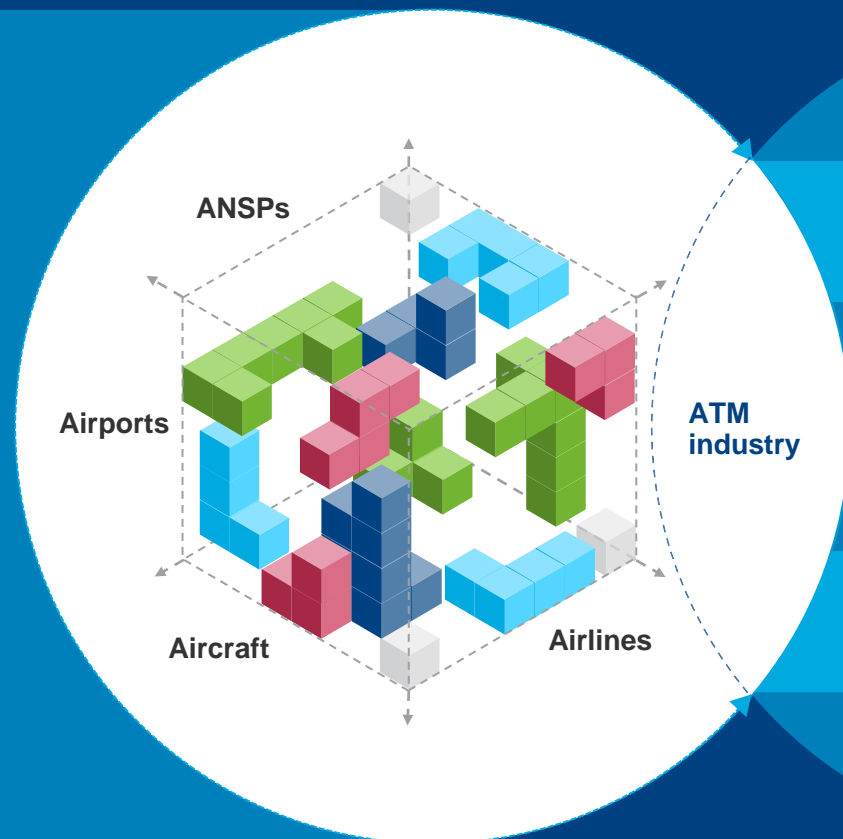
Airspace
modernization



Global Air Navigation
Plan

Aviation System Block
Upgrades

Evolving towards an open ATM ecosystem



Highly automated
and efficient

Open

Data
oriented

Service oriented architecture
Open interfaces
Cloud technology



Cyber security
is an integral part



MosaiX data exchange platform
enabling interoperability


Innovation for the future. Today.

Increasing the capabilities of automation

Highly automated and efficient & data oriented

Voice and video context understanding

AI-supported video processing + speech



Airborne connectivity – future communications infrastructure



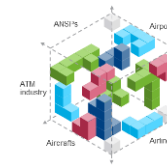


Autonomous ATM



Operational data management





Investing in the next-generation ATM ecosystem

Creating autonomous systems based on industry-leading AI & automation capabilities



Developing future technologies for **ATM voice and data communication and ATM-grade networks**



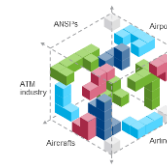
Rethinking **digital towers** and driving solutions for the **surveillance** market



Continuing to invest in integration and **convergence of UTM and ATM** systems



Based on a powerful ATM digital platform: MosaiX



Investing in the next-generation ATM ecosystem

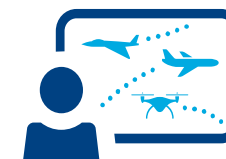
Creating autonomous systems based on industry-leading AI & automation capabilities



Developing future technologies for **ATM voice and data communication and ATM-grade networks**



Rethinking **digital towers** and driving solutions for the **surveillance** market

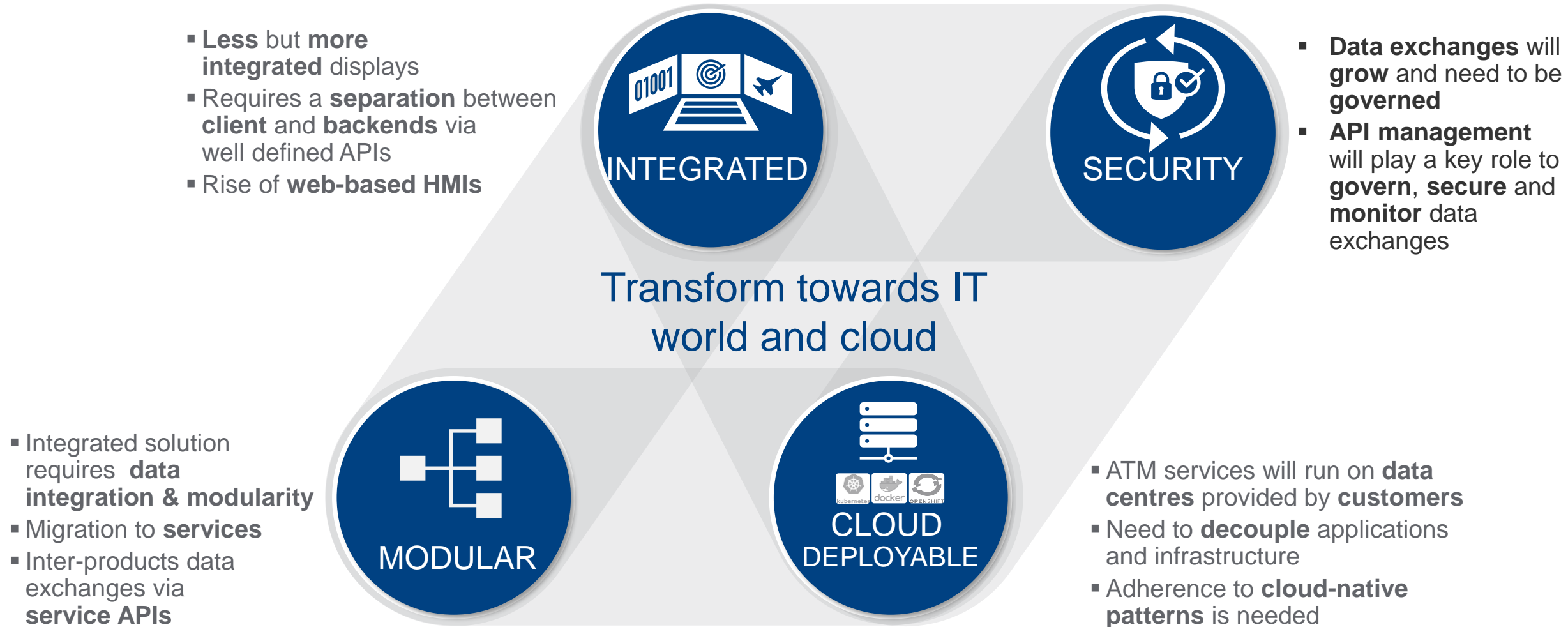


Continuing to invest in integration and **convergence of UTM and ATM** systems

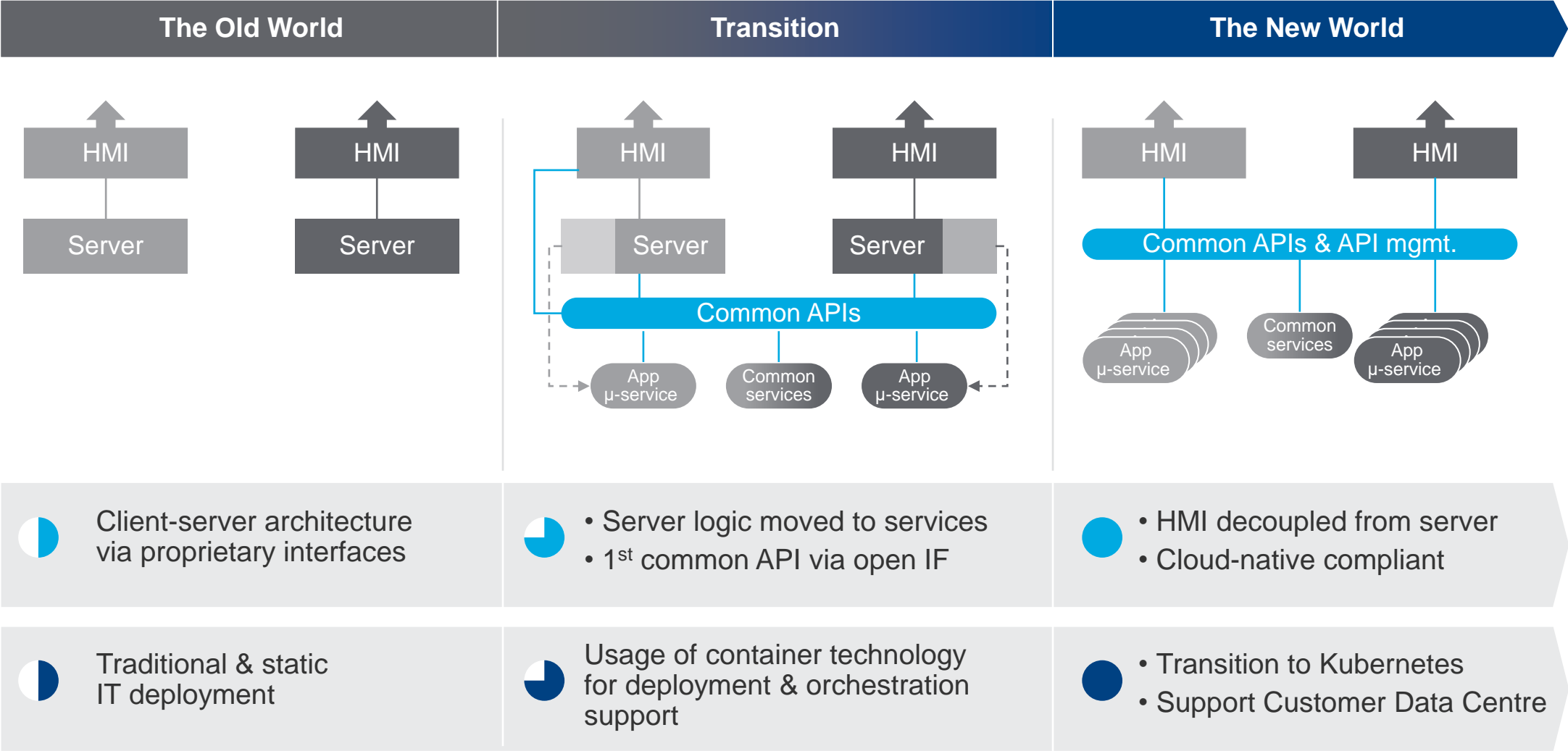
Based on a powerful ATM digital platform: MosaiX

- VCS X10
- LDACS radio
- Future communication infrastructure
- Speech recognition
- Remote digital tower with object detection
- Multi airport centre
- iCWP with Routing & Guidance
- GNSS resilient ADSB
- Flight plan coordination/automation with ATCO

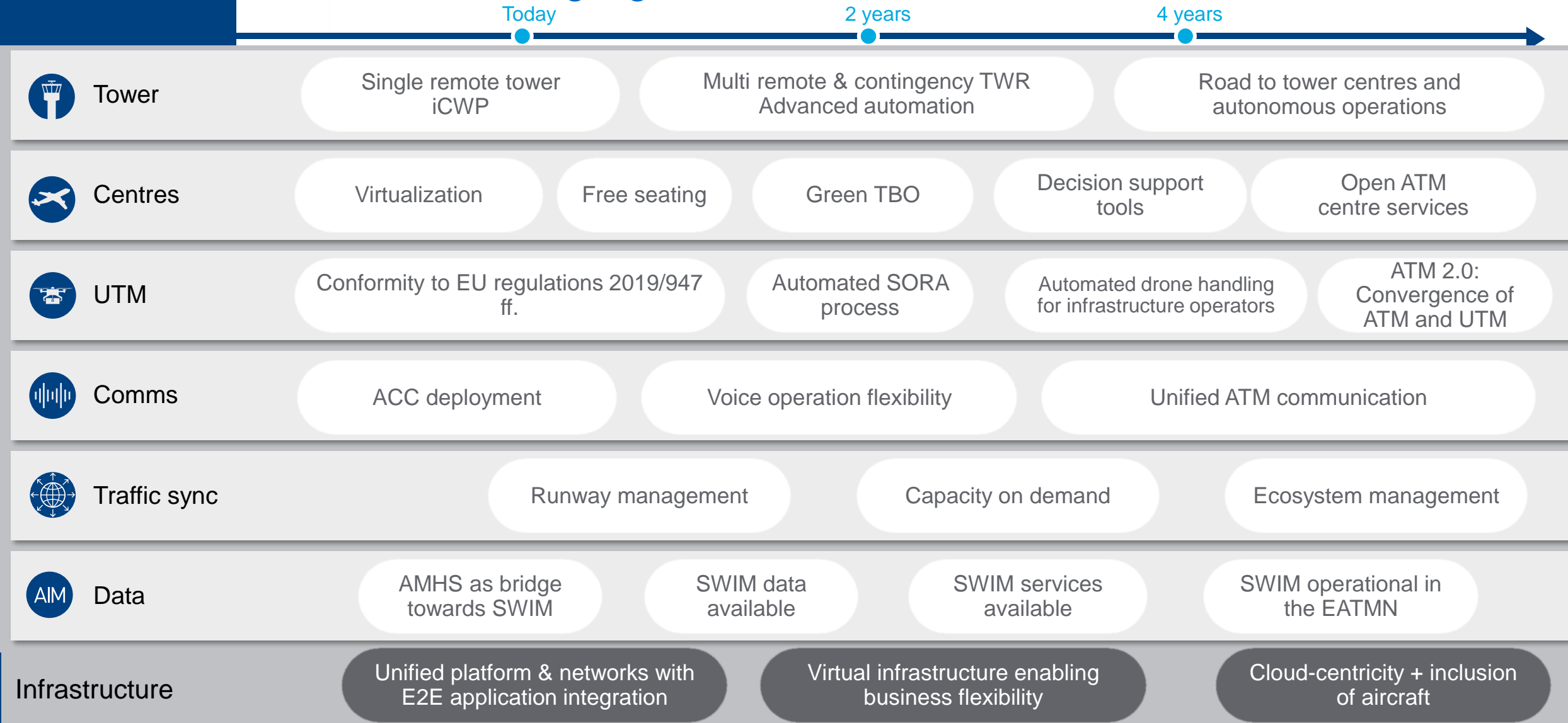
ATM portfolio architecture principles



ATM portfolio architecture principles to transform towards IT world and cloud



Tech outlook – highlights

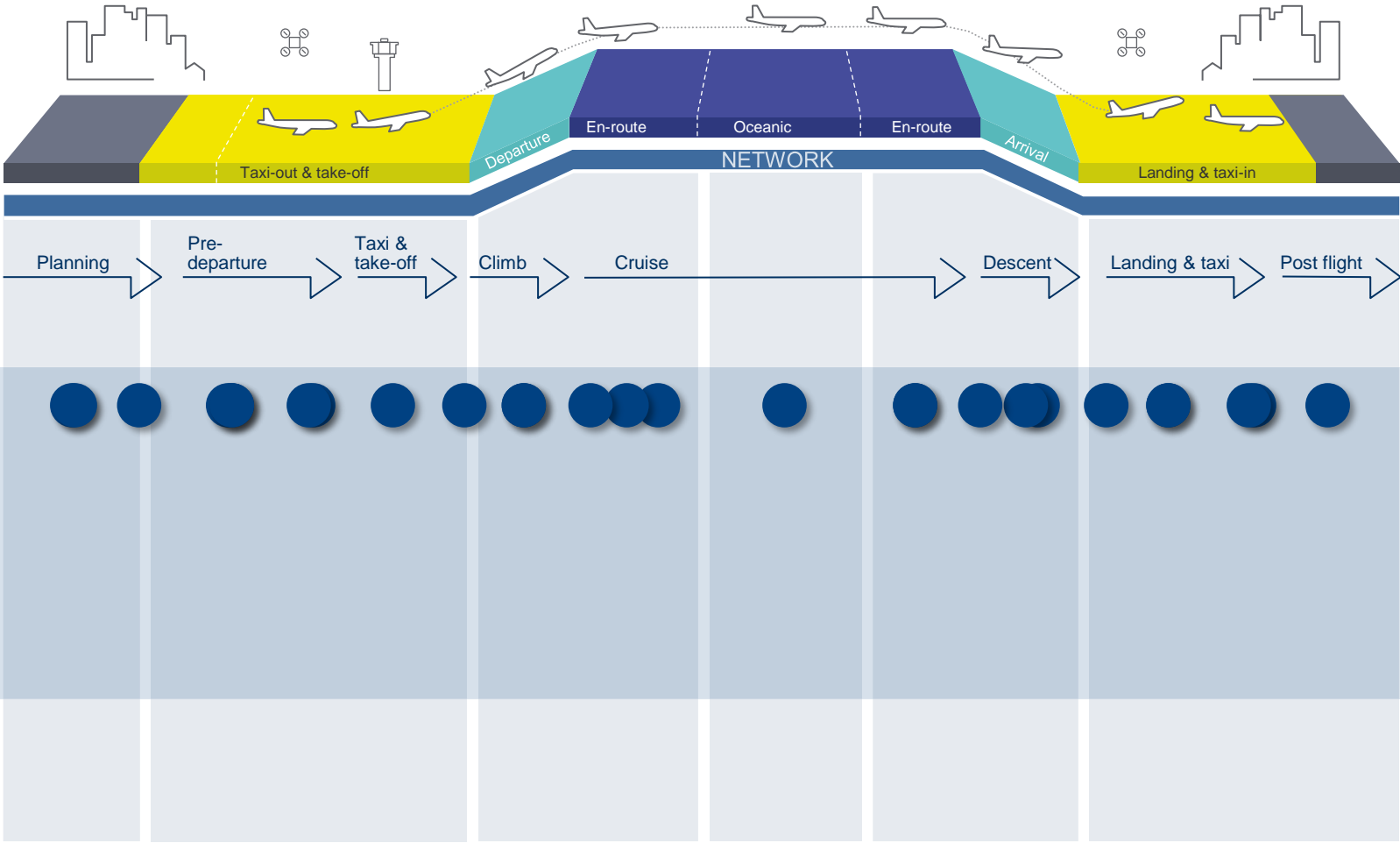


Frequentis ATM Group

Your reliable partner for all ATM solutions

One ATM*

All operational and technology know how under one roof



FREQUENTIS

FOR A SAFER WORLD





THANK YOU

PRESENTER



Juan José Cornejo Fernández

Director of Business Development

Startical

Latest Development in the Industry

CANSO Africa – Dakar, Senegal



07th September 2022

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Indra – Quick overview

New Trends, application for Africa

D NOTAM

UTM

Remote TWR

Startical

A leading global technology and consulting company

We are the technological partner for core business operations of our customers world-wide

Main figures

2021



3,390 M€
in Revenues



52,000
Professionals



+140
Countries



265 M€
in R&D*

* Figure for 2020

Two businesses joined by their technological nature

Transport & Defence

World-leader in providing proprietary solutions in specific segments in Transport and Defence markets



Defence and Security

Envisioning a safer tomorrow

Air Traffic

Creating skies together

Transport

Unlocking life in motion

Digital & Information Technologies

Leading firm in Digital Transformation and IT in Spain and Latin America, through its affiliate Minsait



minsait

An Indra company

Mark making the way forward

Indra in Air Traffic Management

Global player

Guaranteeing safe, efficient and profitable flights, in a difficult context with constantly increasing air traffic

Innovative solutions

Our innovations improve the service resilience of our partners

Environmental benefit

Enabling CO2 and noise reduction of flights, whilst improving capacity



5,700+
Implementations in
over 180 countries

100+
Years of experience
in ATM solutions

85%+
Passengers worldwide
travel making use of Indra
ATM technology at some
point during the flight

Solutions for all segments

Automation/Simulation

725+ Implementations

Communications

700+ Implementations

Navigation

3,400+ Implementations

Surveillance

575+ Implementations

Aeronautical Info

225+ Systems

Space-based CNS

- ADS-B surveillance + Real time VHF communications + Datalink from a satellite constellation in low earth orbit

Indra Air Automation

- ATC Systems
- Turnkey control centers
- Advanced CWP
- ATC Simulation
- InNOVA Tower Solutions
- **Remote Tower Solutions**

Indra Air Communication

- GAREX VCS
- Cometa®
- Neptuno VR

Indra Air Navigation

- GBAS GAST-D
- ILS
- DME & DVOR

Indra Air Surveillance

- PSR 2D
- PSR 3D
- MSSR
- Transportable PSR & MSSR
- ADS-B
- WAM/MLAT

Indra Air Drones

- **UTM System**
- U-space Consulting
- ATM/UTM Integration
- Antidrone Systems

Indra Air Information

- AIS-AIM
- MHS
- SWIM
- MET
- ATM
- **DNOTAM**

Indra Air Services

- ATM Systems as a Service
- Aftermarket & Support Services
- Advisory & Consulting
- ATM & CNS Training

Wide footprint in Africa, tech as key driver for growth

Implementations in 49 countries, mainly in ATM



References in **49 countries**

Leader in Air Traffic & Airport Management Solutions

Hundreds of deployments of own manufactured solutions in Africa:

ATC: ACC, APP, TWR, SIM, A-SMGCS

SURV: PSR, PSR3D, MSSR, ADS-B, SMR

COM: VCCS

INFO: AMHS, AIM

NAV: ILS, DVOR; DME

Index

Indra – Quick overview

New Trends, application for Africa

D NOTAM

UTM

Remote TWR

Startical

Impact of ASBU Requirement For Africa

- Enables and guides States/ANSPs to plan and modernize their CNS/ATM systems in line with ASBU framework
- It acts as a guidance for States/ANSPs to comply to the ICAO identified key operational improvement areas and objectives
- It provides a reference framework for States to gauge their effective implementation and compliance to ICAO initiatives
- ANSPs can define their system specifications to be in line with ASBUs evolution

Block 0 2013 - 2018

Airport Operations		AIM	ATM	MET	MHS	SWIM
BO-APTA	Optimization of Approach Procedures including vertical guidance	■	■	□	□	□
BO-SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	■	□	□	□	□
BO-ACDM	Improved Airport Operations through Airport-CDM	■	■	■	■	■

Globally Interoperable Systems and Data		AIM	ATM	MET	MHS	SWIM
BO-FICE	Increased Interoperability, Efficiency and Capacity through Ground-Ground-Integration	□	■	□	□	■
BO-DAIM	Service Improvement through Digital Aeronautical Information Management	■	□	□	□	■
BO-AMET	Meteorological Information supporting enhanced operational efficiency and safety	□	■	■	□	■

Efficient Flight Paths		AIM	ATM	MET	MHS	SWIM
BO-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDOs)	■	■	□	□	□
BO-CCO	Improved Flexibility and Efficiency in Departure Profiles - Continuous Climb Operations (CCOs)	■	■	□	□	□

Block 1 2019 - 2024

Airport Operations		AIM	ATM	MET	MHS	SWIM
B1-APTA	Optimized Airport accessibility	■	■	□	□	□
B1-SURF	Enhanced Safety and Efficiency of Surface Operations - SURF, SURF IA and Enhanced Vision Systems (EVS)	■	□	□	□	□
B1-ACDM	Optimized Airport Operations through Airport-CDM	■	■	■	■	■
B1-RATS	Remotely Operated Aerodrome Control	□	■	□	□	□

Globally Interoperable Systems and Data		AIM	ATM	MET	MHS	SWIM
B1-FICE	Increased Interoperability, Efficiency and Capacity through FF-ICE, Step 1 application before Departure	□	■	□	□	■
B1-DAIM	Service Improvement through Integration of all Digital ATM Information	■	□	□	□	■
B1-SWIM	Performance Improvement through the application of System Wide Information Management (SWIM)	□	□	□	□	■
B1-AMET	Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-Term Service)	□	□	■	□	■

Efficient Flight Paths		AIM	ATM	MET	MHS	SWIM
B1-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDOs)	■	■	□	□	□
B1-RPAS	Initial Integration of Remotely Piloted Aircraft (RPA) Systems into non-segregated airspace	■	■	■	□	■

We develop solutions aligned with ASBU strategy for every performance improvement areas to achieve the safe, efficient and modern aviation of tomorrow.

Web-based application
for origination,
management,
visualization and
distribution of Digital
NOTAM events,
compliant with Digital
NOTAM Specification 2.0.



DNOTAM – Key Features

- Manages NOTAM information using AIXM5.1 database
- Tailored origination forms for each event type
- Automatic validation based on event specific business rules
- Auto-filling data rules based on event type and provided data
- Text NOTAM preview generation
- Support both ICAO Text NOTAM and DNOTAM versions
- Enables visualization of affected areas using AMDB data

Event

Valid from: 2021-04-12 17:40:00 Valid to: 2021-05-22 00:00:00

Event Name: RWY.CLS

Referenced Runway/Runway Direction: Runway Designator: 08R.26L Designator: LFPQ Name: CHARLES-DE-GAULLE

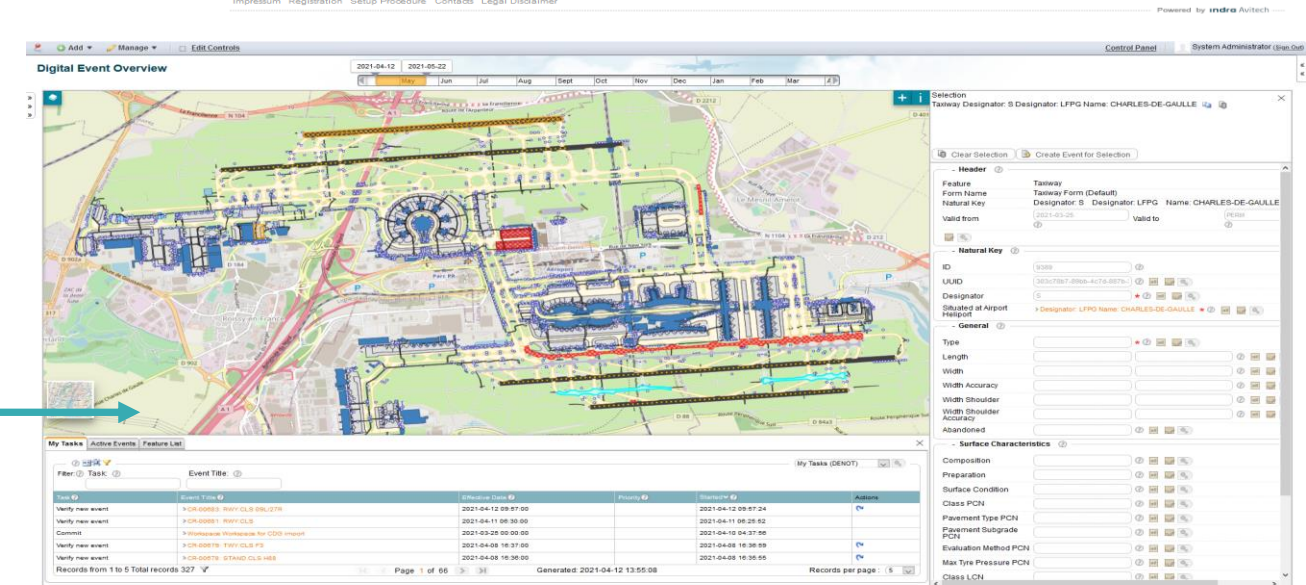
Closure Reason: maintenance

Note:

Schedules:

Text NOTAM Preview:

Q) LFFF/QHRLC/IV/HBO/A/000/999/4901N00233E005
A) LFPQ
B) 2104121740
C) 2105212359
D) DAILY -
E) 08R/26L CLOSED DUE TO MAINTENANCE.



Indra DNOTAM Benefits

- Streamlines NOTAM production and distribution
- Reduces information overload by allowing precise filtering of information relevant to the flight
- Minimizes misinterpretation by presenting NOTAM information visually and as well as normal text
- Distributes Digital NOTAM and ICAO text NOTAM in parallel via AMHS, AFTN, CIDIN and SWIM interface
- Digital NOTAM ensures pilots receive the information relevant to their specific flight

Indra Air Drones

10+ projects in less than 3 years

State-of-the-art cloud based platform for UTM

Best antidrone solution in the market



UTM-Hub

Core of the UTM system providing a connectivity layer to exchange information and services



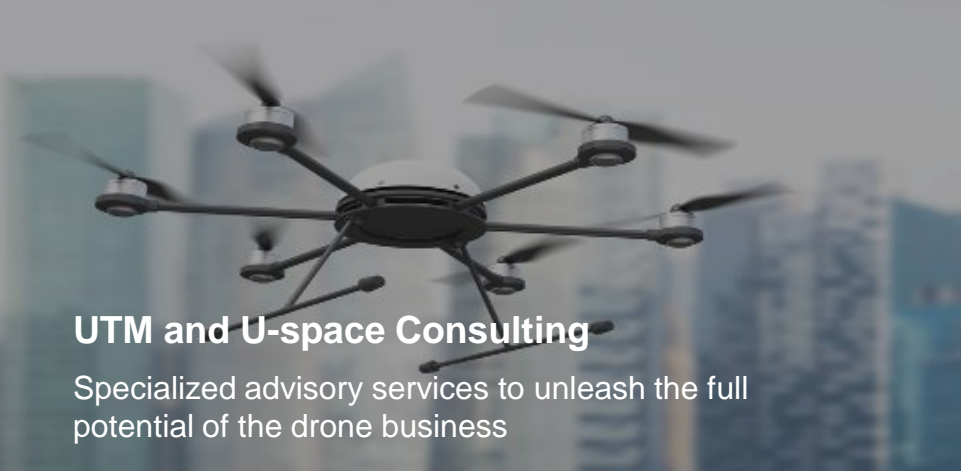
UTM-Connect

Multiplatform USP that provides real-time connectivity and information to all UTM stakeholders



ATM-UTM Integration

Best choice for unlocking the potential of drone applications and open new skies for commercial exploitation



UTM and U-space Consulting

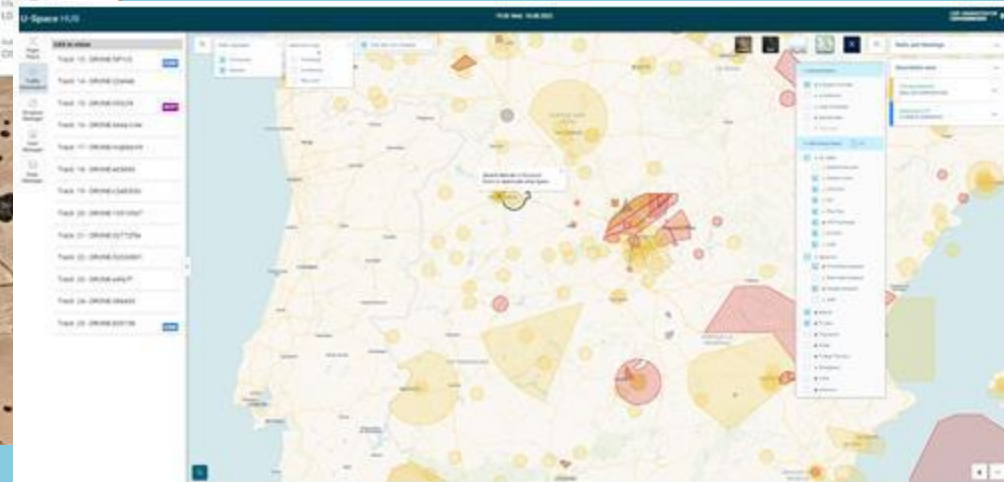
Specialized advisory services to unleash the full potential of the drone business



Indra ARMS Antidrone System

Flexible and scalable counter-UAS system that provides the most advanced tools to combat UAS threats

UTM supports the safe and efficient integration of RPAS within airspace



Remote Towers

IRTOS Remote Tower System

Fully integrated remote tower platform for single or multi-airport set up



- A complete solution for digital, remote and contingency towers
- Operate single or multiple airports from one CWP
- Up to 60% cost reduction.
- Heads-Up Display (HUD) with unmatched image quality:
 - panoramic view,
 - pan-tilt-zoom,
 - 4K resolution, and
 - dedicated or common video wall
- Heads-Down Display (HDD) that maximizes situational awareness:
 - a single 40" screen integrated with comprehensive ATC tools,
 - advanced safety nets and automated functionality,
 - user-friendly HMI, and
 - used in the world's largest remote tower program (Avinor, Norway)

Mast and cameras

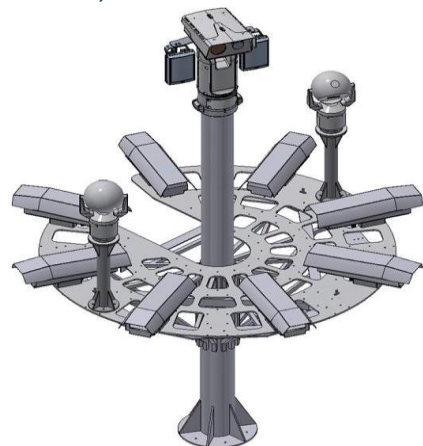
Maximum quality at an affordable price



Proprietary design of both mast and camera support platform

Usual deployment for single mast with 360° view includes:

- 8x cameras panorama (360°)
- 3x PTZ (2x Visual & 1x Visual/Thermal)



4k COTS cameras

- Usual deployment with 4K but IRTOS can also accommodate UHD cameras
- All components are COTS
- Including housing solution for protection

Two types of PTZs: only visual and visual & thermal

- IRTOS system can control independent PTZs
- PTZ housing also includes cleaning and climate control
- Signal Light Gun for emergency situations



Videowall and controller working position

Maximum flexibility in control position design with or without integration with ATM systems



IRTOS can go even further

IRTOS supports all sorts of applications related to tower control

1. Digital Remote towers for both single and multi-rTWR operation
2. Multi-airports control centers
3. Contingency towers, as a global ATM contingency strategy for route, approach and TWR systems
4. Temporary or mobile towers
5. Airport upgrades, complementing the existing tower without the need of auxiliary towers
6. Evolution of the conventional tower to the Digital Tower, introducing new functions and concepts such as "Intelligent Binoculars", "Augmented Reality", "Track Object Detection (FOD)", "Head-Up display of integrated ATM / A-SMGCS data"
7. Intelligent gap-filling, replacing current CCTV systems used in complex airports



Indra is currently involved in the two largest projects of remote towers in the world

Project NINOX in Norway

- First and largest multi-airport project in the world
- 15 RCA in one center located in Bodo
- Up to 35 airports in the next 3-5 years (TBD)



Remote Tower for Budapest Airport

- Largest single-airport multi-mast project in the world
- 1 mast with 360 view + 6 additional masts (130-270)
- Full integration (info and functionality) with tower system (5 positions)



InNOVA Tower Systems

The most advanced and complete ATC system

- **Scalable and modular**
For global hubs and small regional airports
- **Smart automation**
Improve efficiency with the latest SESAR research
- **Forward compatible**
A long-term platform for continuous growth



Increase safety and efficiency with world-leading innovations and next generation automation.


- An integrated solution with A-SMGCS, approach systems, advanced safety nets and electronic flight strips
- World leader in digital remote towers
- Ready for multiple remote tower operations
- Complies with SESAR and ASBU technology roadmaps, current and future

startical



SATELLITE-BASED VHF VOICE AND DATA COMMUNICATIONS

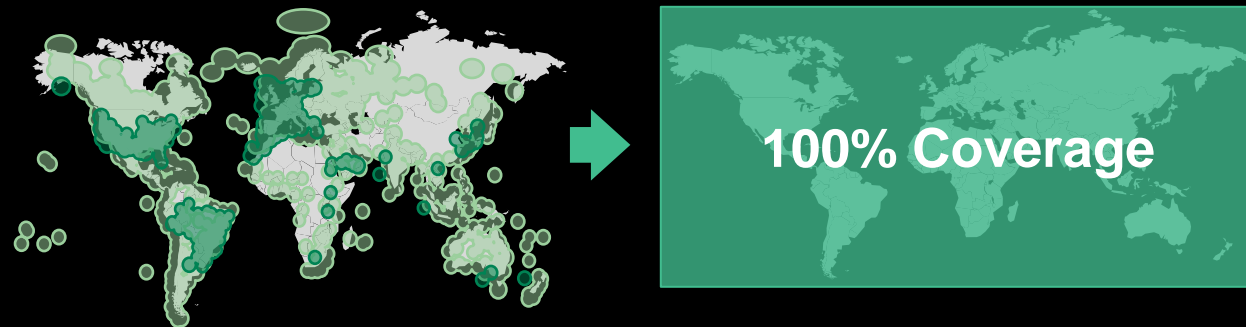
Powered by

ENAIRe  | **indra**

WHAT'S THE PROBLEM?

OCEANIC AND REMOTE AREAS HAVE LIMITED CNS INFRASTRUCTURE, WHICH CONDITIONS SEPARATION STANDARDS

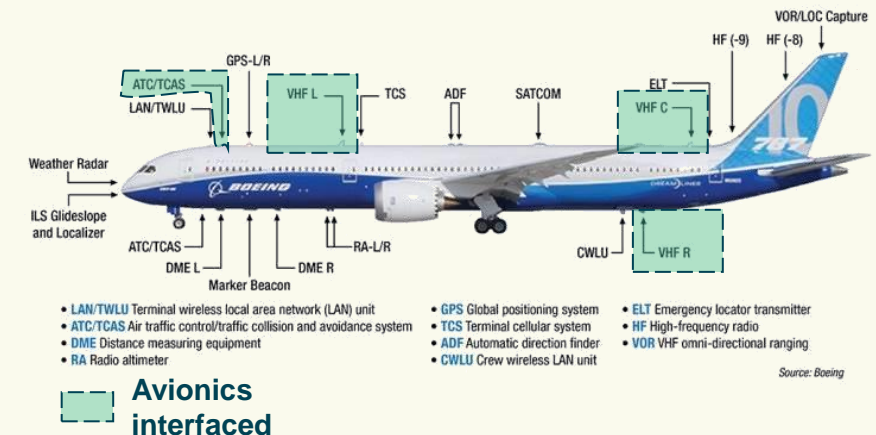
To provide the same services all over the world without performance gaps, CNS services in oceanic & remote areas need to be the same as in continental areas



VHF COMMUNICATIONS FROM SPACE CAN PROVIDE GLOBAL COVERAGE OF VHF AMS(R) SERVICES INCLUDING OCEANIC AND REMOTE AREAS

AIRCRAFTS DON'T NEED ANY ADDITIONAL AVIONICS EQUIPMENT OR RETROFIT

VHF communications is an existing technology, a standard present in every aircraft independent from any manufacturer or service provider.



There are many initiatives ongoing to provide VHF communications from space but to achieve this goal the first step is the regulatory processes in ITU.

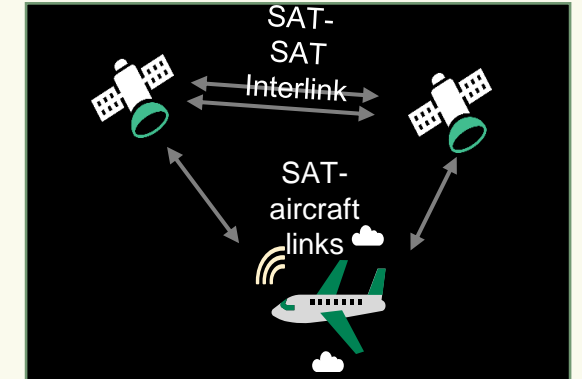
The aeronautical community support is needed.

SPACE-BASED VHF COMMUNICATIONS

SB VHF COMMS AND ADS-B WILL ALLOW TO PROVIDE RADAR-LIKE SEPARATION

Space-based VHF communication is a concept in which aircraft provide communications between the aircraft to air traffic control (ATC) via satellite-based VHF.

This concept, when implemented, is expected to support air traffic management and flight operations in oceanic and remote airspace and will complement current aviation use of satellite-based navigation and surveillance technologies (e.g. ADS-B, ADS-C).



- To apply radar-like separation for civil aircraft, surveillance must be complemented with effective communications.
- Space-based ADS-B has to be complemented with Direct Controller-Pilot Communications (DCPC).

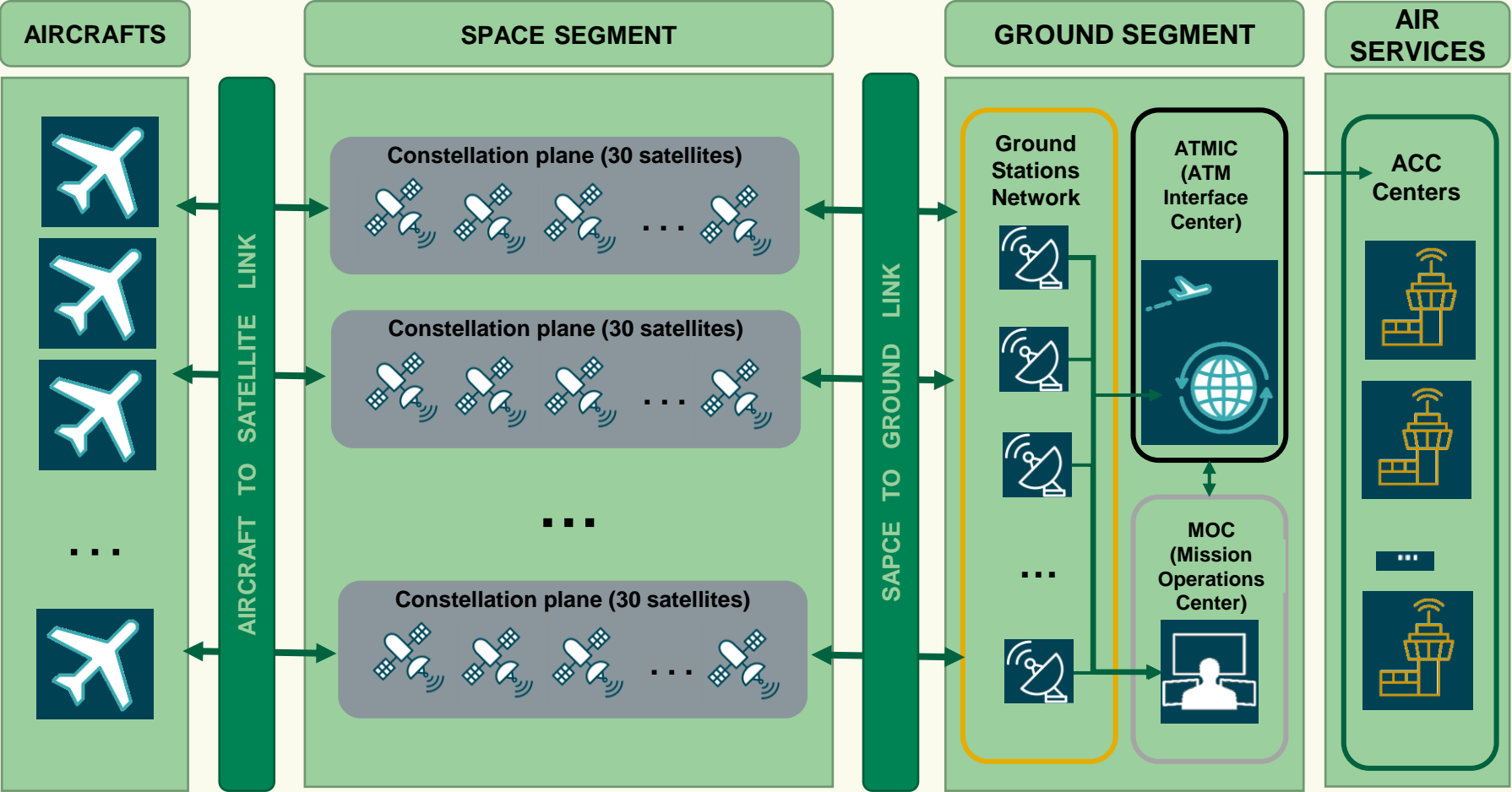
SB COMMUNICATIONS
+
SB SURVEILLANCE



RADAR-LIKE
SEPARATION
IN OCEANIC

SOLUTION ARCHITECTURE

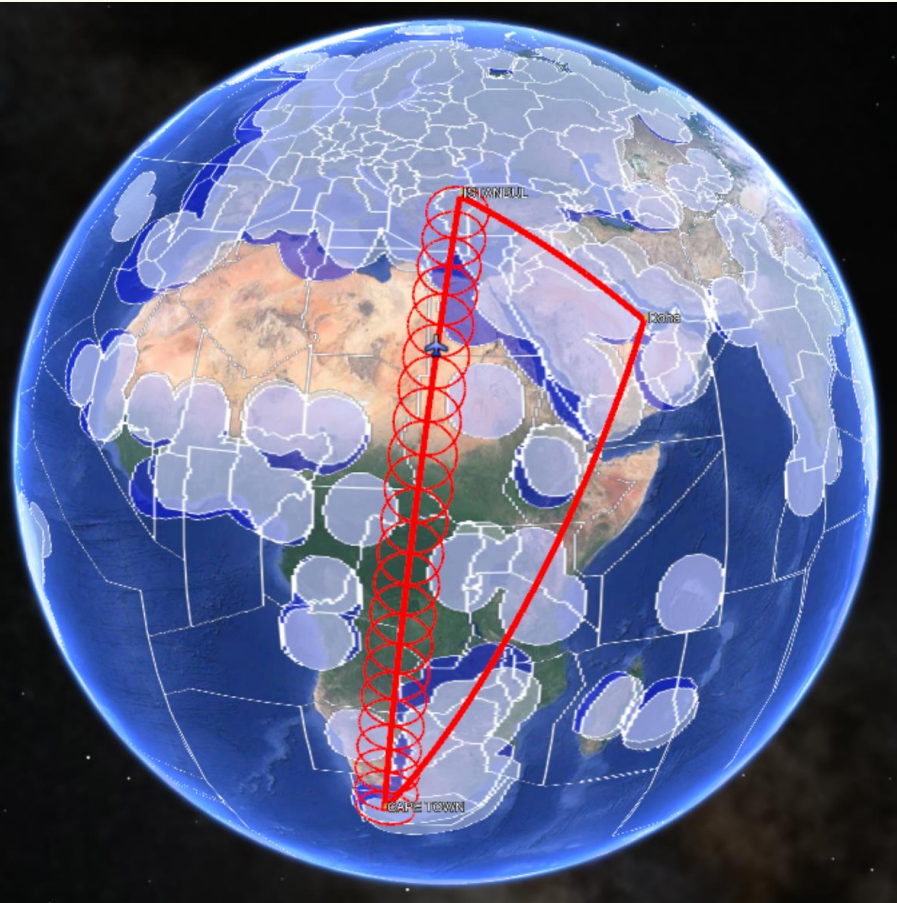
OVERALL CONSTELLATION ARCHITECTURE



7 Planes
30 satellites per plane

Redundant global
coverage in all parts of
the globe.

DIRECT FLIGHT ISTANBUL – CAPE TOWN VERSUS ALTERNATIVES



Flight Istanbul – Cape Town (IST-CPT):

	Direct Flight	Alternative Trajectory
Distance	~8.400 Km	~10.100 Km
Time	~10 h 35 min	~16 h (14 h flight + 2h 1 scale)
Fuel Consumption ⁽¹⁾	~151.200 litres	~201.600 litres
CO2 Emissions ⁽²⁾	~478 tonnes	~635 tonnes

Differential of routes (Alternative versus Direct):

- Distance: ~1.700 Km (+20%)
- Time: ~5 h 25 min (+52%)
- Fuel consumption: ~ 50.400 litres (+33%)
~53.000\$⁽³⁾
- CO2 emission: ~ 157 tonnes (+33%)
- Aircraft amortization ?
- Pilot Differential Cost ?
- Opportunity cost lost ?

(1): Data reference for a Boeing 747
(2): 3.15 g CO2 per g fuel
(3): Referred to Aviation Turbine Fuel average prices

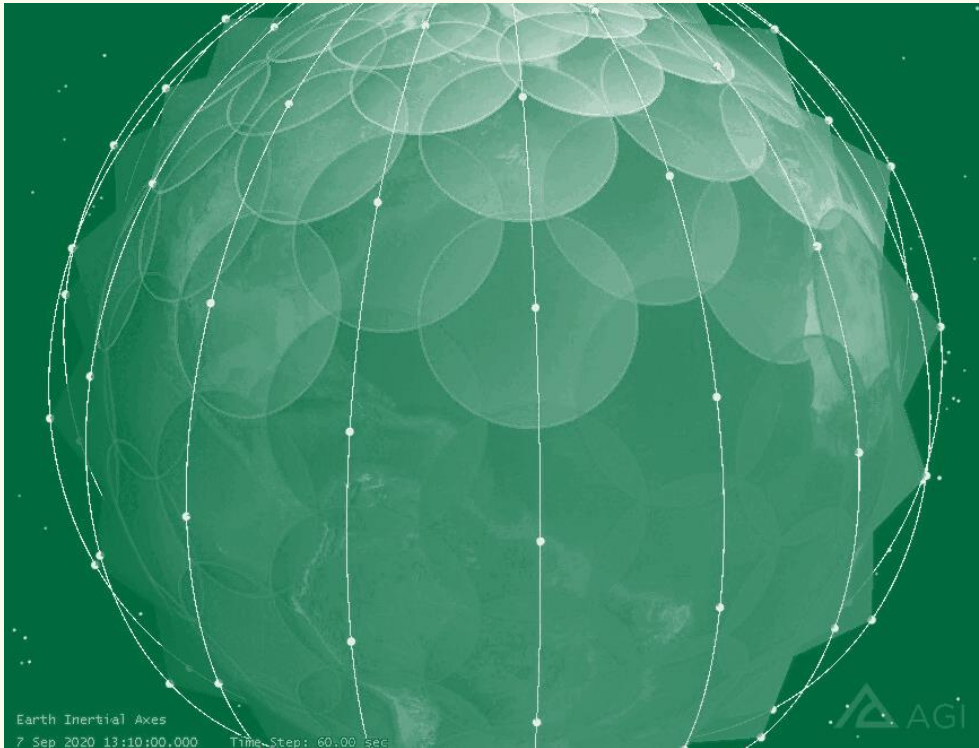
SATELLITE-BASED INFRASTRUCTURE IMPLEMENTATION

CNS / ATM INFRASTRUCTURE AS A SERVICE

Ready to use infrastructure

Available technology
without investment

New safe available routes,
optimizing flight time, fuel
consumption and CO2 emissions



CNS infrastructure:

- In ground: Only for a Minimum Operational Network.
- In Space:
 - Just Now, VHF Communications to help infrastructure implementation deployment.
 - Next Future, Wideband Communications with new technologies.
 - Surveillance from Space based on ADS-B signals reinforced by Multilateration integrity procedures.
 - Navigation based on GNSS as GPS, Galileo, Glonass, Beidou.

Automation Systems:

- Automation Systems in cloud with only several ACCs system for safety backup.

Development of Operational Procedures and Training:

- Free routes and real time algorithms exchanging M2M the Flight Plan and the Controller as a supervisor.

SATELLITE BASED VHF SERVICES

SUMMARY

- Startical will provide VHF Voice and Data communications as well as ADS-B surveillance services from space for oceanic and continental areas providing an alternative to traditional ground infrastructures.
- Satellite-based services doesn't require any relevant investment from ANSPs and almost eliminates the start-up time.
- Regulatory processes both in ITU and ICAO are necessary. The aeronautical community support will help to achieve this goal.

indra
At the core



THANK YOU

THE NEXT GENERATION OF ATM – LEAP-FROGGING TECHNOLOGY IN AFRICA, INFRASTRUCTURE SHARING AND OTHER NEW TRENDS. WHAT ABOUT THE ASBU FRAMEWORK?

THANK YOU

TO OUR SPONSORS



THANK YOU

TO OUR EXHIBITORS





THANK YOU
TO OUR NETWORKING BREAK
SPONSOR

IMPLEMENTATION STATUS OF THE AFRICAN ANSP PEER REVIEW MECHANISM – THE TRANSITION PHASE BEYOND SMS

FACILITATOR



Loise Mwangi

CANSO Focal Point
Kenya Civil Aviation Authority

GUEST SPEAKER



François-Xavier Salambanga

Regional Officer Communication, Navigation, Surveillance

ICAO WACAF



ICAO

UNITING AVIATION

CANSO Africa Conference 2022

Dakar, Senegal, 6-9 September 2022

**Implementation Status of the African ANSP Peer Review
Mechanism – The Transition Phase beyond SMS**

**Presented by Francois Xavier Salambanga, Regional Officer Communications,
Navigation & Surveillance**



Outline

- I. Objective of the Peer Review Mechanism**
- II. Background and Key Milestones**
- III. Scope and structure of the Peer Review Mechanism**
- IV. AFI Plan Project on ANSP Peer Review Programme**
- V. Achievements**
- III. Challenges and Way Forward**
- III. ICAO Assistance to the ANSPs Peer Review programme**



Objective of the Programme

- Promote continuous improvements of Air Navigation Services (ANS) through identification of areas of operations that can be enhanced
- Facilitate a structure whereby corrective action plans can be developed as necessary.



Background and Key Milestones

- **4 February 2015, Montreal:** ICAO Council President's call for a peer review among and between ANSPs as "a very tangible mechanism to improve the capabilities of ANSPs as part of ICAO's NCLB goal."
- **7 March 2015, Madrid:** Agreement on African ANSP Steering Group (AASG)
 - ASECNA, ATNS, Ghana, Kenya, Mozambique, Nigeria, CANSO, ICAO, AFAC (observer)
- **12 June 2015, Durban:** Adoption of ToR (ANS Safety and Quality Assurance-ASQA)
- **01 December 2015, Yamoussoukro:** Development of framework based on CANSO SoE (SMS), ICAO Annexes and Draft Peer Review Manual



Background and Key Milestones (continued)

- **September 2016, Accra:** Establishment of 5 Teams of ANSPs
 - ATNS, ASECNA, Botswana,
 - Uganda, Tanzania, Kenya, Rwanda Burundi,
 - NAMA, ROBFIR, Ghana,
 - Mozambique Zambia, Zimbabwe, Malawi, Madagascar,
 - Morocco, Tunisia, Algeria, Mali
- **1st October 2016, Montreal:** Call for ANSP Meeting to define the scope, the cooperation framework, roles and processes
- **3-5 May 2017, Freetown:** Adoption of the framework of cooperation, the peer review Manual and the 2017/18 Roadmap



AFI Plan Project on ANSP Peer Review Programme

Objective:

To establish a **peer review mechanism** among and between ANSPs to improve the capabilities of the ANSPs and enhance the **SAFETY** and **QUALITY** of air navigation services in Africa.

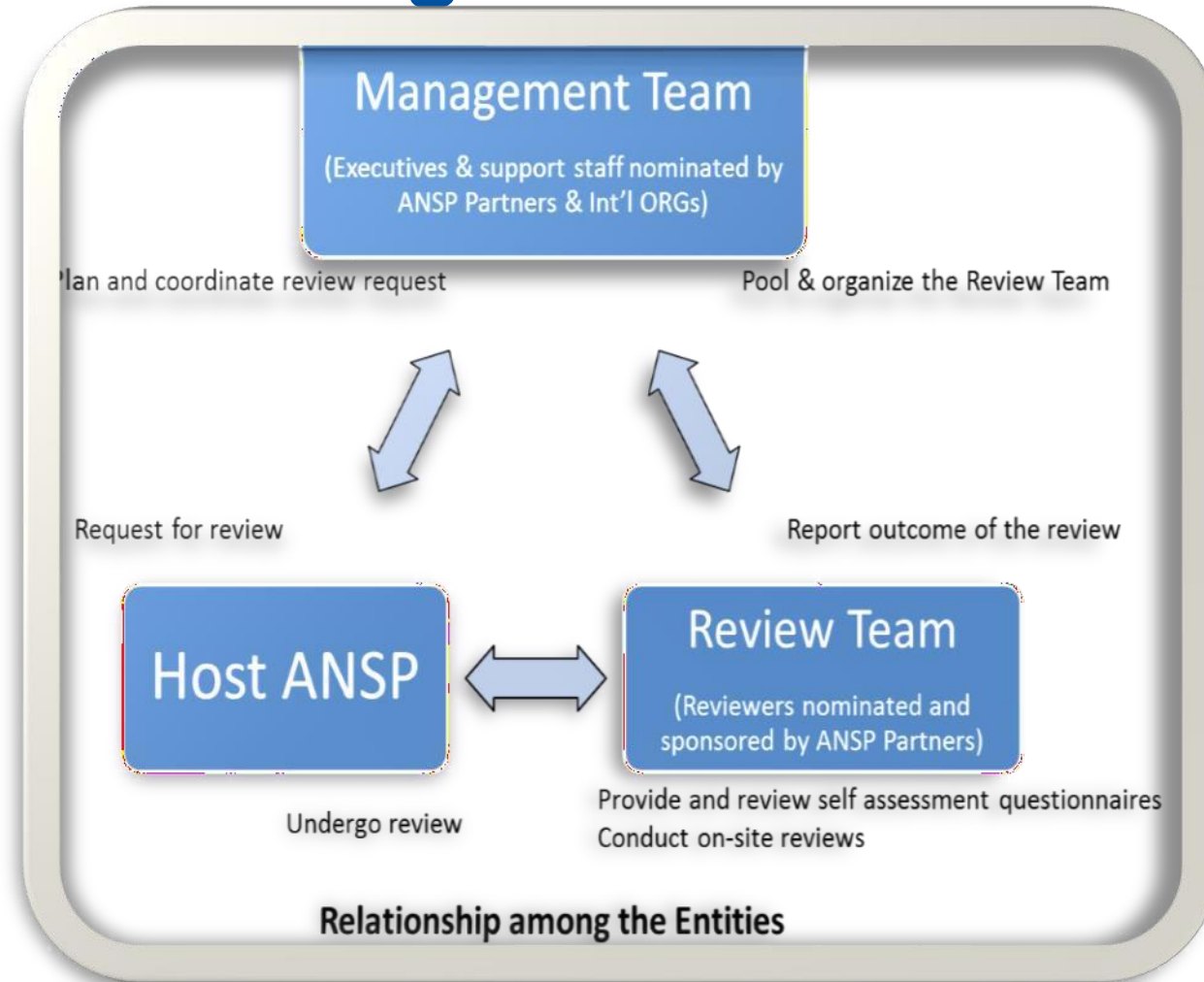
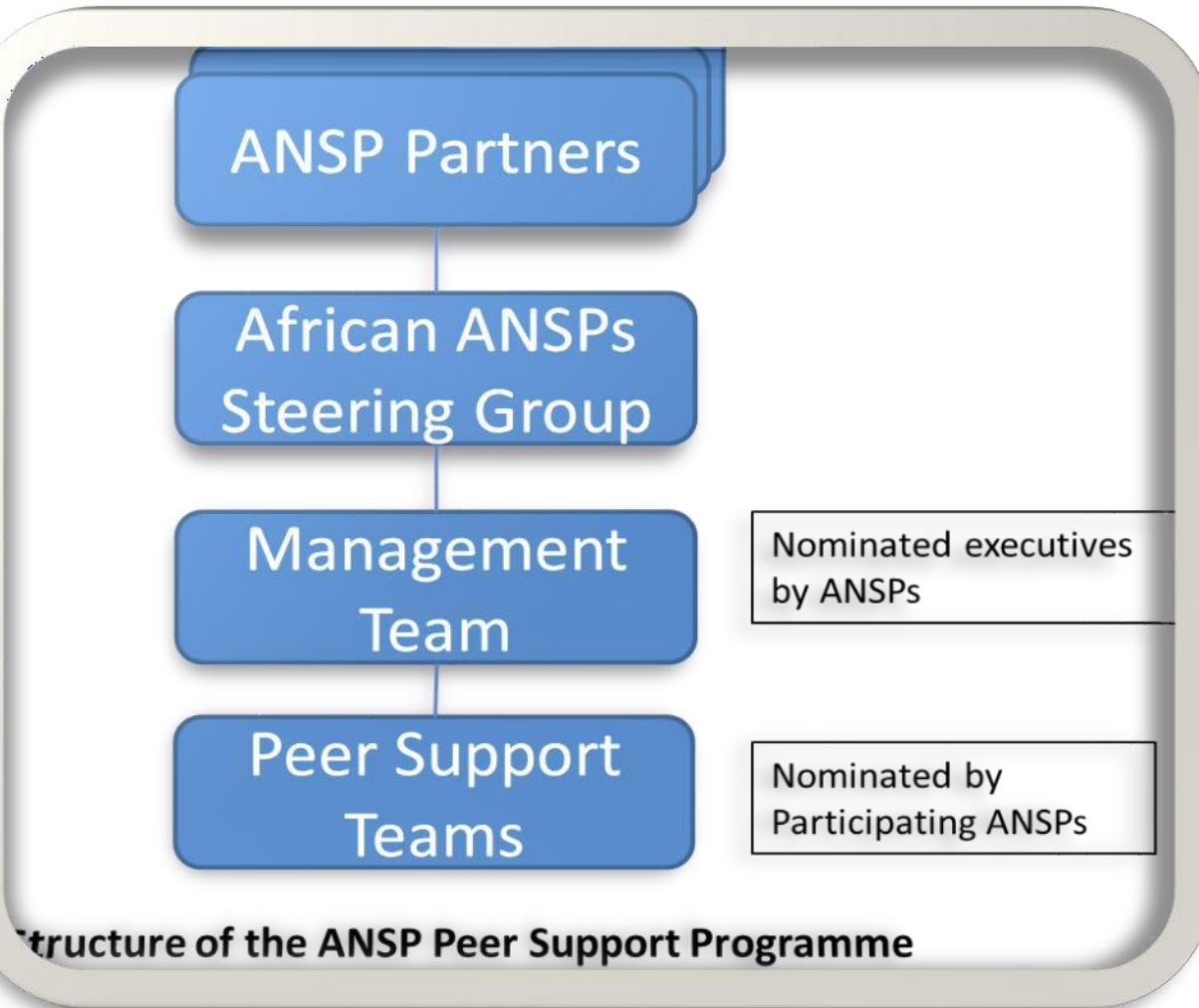
Key activities

- Preparation of Peer Review Documents
- Conduct of Peer reviews
- Implementation of CAPs

Stakeholders

- Beneficiary States/ANSPs: All African States
- ICAO: Regional Offices – Headquarters - AFI Plan
- Donor ANSPs: African ANSPs
- Technical Partners: AFCAC – Other regional commissions – CANSO – RSOOs
- Other Partners: Financial Institutions – RECs

Structure of the Peer Review Programme





Nature and conduct of the Programme

- Review areas include:
 - Air traffic services (ATS) (Annexes 2, 11 and Doc 4444)
 - Meteorological service (MET) (Annex 3)
 - Operation of aircraft – Flight Procedures (PANS/OPS) (Annex 6 and Doc 8168)
 - Communications, Navigation, Surveillance (CNS) (Annex 10) and Doc 8071
 - Search and rescue (SAR) (Annex 12)
 - Aeronautical information management (AIM) (Annex 15) and Doc 10066
 - Safety Management (SMS) (Annex 19, CANSO SoE in SMS)



ANSP Peer Review Manual

The ANSP Peer Review Manual:

- describes the nature and the conduct of the Programme, and
- provide detailed guidance to stakeholders involved in the planning, preparation, conduct and reporting of the peer support activities, including:
 - ✓ participating ANSPs as ANSP Partners
 - ✓ participating ANSPs as Host ANSPs
 - ✓ international organizations,
 - ✓ management team (MT) and its support staff,
 - ✓ team leaders (TLs),
 - ✓ team members (TMs)



- Organization of a Regional Workshop on African ANSP Peer Review Programme Manual
- Implementation of the AFI Plan ANSP Peer Review Project
- Continuation of ANSP Peer Review activities by established groups
- Implementation of African ANSP Peer Review Programme using the standardized framework for ANSP: Peer reviews conducted by ASECNA, GCAA and ATNS
- Cooperation among African ANSPs in identified areas
- African ANSPs meeting Lomé, Togo 28 March - 1st April 2022

Challenges

- Impact of the COVID-19 Pandemic
- Low commitment of ANSPs in the Peer Review programme
- Low pace of conduct of Peer Reviews by ANSPs
- Lack of continuous follow up and effective reporting on CAPs resulting of Peer Review findings

Challenges

- Low reporting/sharing on the implementation of Pilot F CAPs;
- Lack of training of Peer Reviewers;
- Peer Review Questionnaire limited to the ATS area



Items	Tasks	Team	Lead
Establishment of a Cooperation Framework for African Air Navigation Service Providers Peer Review Programme	Revise the African ANSPs' Peer Review reference guidance material (Manual, Review Questionnaire, etc., performance measurement and reporting, etc...)	ASECNA ATNS CANSO ICAO	ASECNA
	Organize appropriate training of reviewers on guidance material and available tools	ASECNA ATNS, Steering Committee Members CANSO ICAO	ICAO
	Translate ANSPs' Peer Review Programme reference documents in English and French languages	ANSPs	CANSO & ASECNA



Way Forward: Key Tasks

Items	Tasks	Team	Lead
Implementation of African Air Navigation Service Providers Peer Review Programme	Coordinate and conduct African ANSPs' Peer Reviews, by Teams of selected reviewers, in accordance with the established framework	Management Team ANSPs ICAO	ASECNA
	Coordinate African ANSPs' Peer Review activities according to the established reference framework as amended	Management Team ICAO	ATNS

ICAO support through the AFI Plan Peer Review Project

- AFI Plan Project on the African ANSP Peer Review reviewed and updated;
- Programme of activities established in accordance with the adopted framework;
- Supporting documents subject to revision/update identified by the project;
- Availability to assist for the implementation of the key tasks identified by the Lomé ANSP meeting



ICAO DAKAR UNITING AVIATION



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Central American
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Mexico City

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(SAM) Office
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North Atlantic
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Paris

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(MID) Office
Cairo

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Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Sub-office
Beijing

Asia and Pacific
(APAC) Office
Bangkok



THANK YOU

AFRICAN ANSP/5

FUTURE WORK PROGRAMME

Items	Tasks	Team	Lead	Timelines for completion	Comments
I. Establishment of a Cooperation Framework for African Air Navigation Service Providers Peer Review Programme	1. Revise the African ANSPs' Peer Review reference guidance material (Manual, Review Questionnaire, etc., performance measurement and reporting, etc...)	ASECNA ATNS CANSO ICAO	ASECNA	31/08/2022	
	2. Organize appropriate training of reviewers on guidance material and available tools	ASECNA ATNS, Steering Committee Members CANSO ICAO	ICAO	30/11/2022	
	3. Translate ANSPs' Peer Review Programme reference documents in English and French languages	ANSPs	CANSO & ASECNA	31/08/2022	
II. Implementation of African Air Navigation Service Providers Peer Review Programme	4. Coordinate and conduct African ANSPs' Peer Reviews, by Teams of selected reviewers, in accordance with the established framework	Management Team ANSPs ICAO	ASECNA	31/12/2022 & beyond	
	5. Coordinate African ANSPs' Peer Review activities according to the established reference framework as amended	Management Team ICAO	ATNS	31/08/2022	

III. Cooperation among African Air Navigation Service Providers	Carry out joint initiatives to:	ANSPs ICAO APIRG/AAO/SG APIRG/IIM/SG Other partners	ASECNA	Continuously	
	6. Develop regional programmes to implement Global Air Navigation Plan (GANP) and Regional Air Navigation Plan (ANP) requirements	ANSPs	ICAO	APIRG Regional Projects available	Ref. APIRG Projects Approach
	7. Meet ANS key performance objectives and targets adopted by APIRGs	ANSPs	AFCAC	30/11/2022-APIRG/25	
	8. Conclude all relevant MoUs to implement APIRGs requirements including surveillance data sharing, AMHS, AIDC, VoIP, PBCS etc.	ANSPs	ASECNA	31/08/2022	ASECNA to share available MoUs
	9. Adopt a cooperative approach towards RPAS operations in non- segregated airspaces in the region	ANSPs ICAO Other partners	ICAO	30/11/2022-APIRG/25	
	10. Cooperate and actively provide the necessary support to information and data collection methodology, performance monitoring and measurement, and reporting on air navigation system	ANSPs ICAO Other partners	ICAO	30/11/2022-APIRG/25	
	11. Identify/Develop supporting tools to enable collection, analysis and sharing of data	ANSPs	ICAO	30/11/2022-APIRG/25	
	12. Set up mechanisms for pooling of resources (human, training, expertise, infrastructure)	ICAO	ICAO	30/11/2022-APIRG/25	
	13. Maintain communication and ensure promotion of the African Air Navigation Service Providers Peer Review Programme, using national, regional and international fora/events, websites and media	Other partners	ASECNA	31/08/2022	
	14. Support to the Peer Review Programme through the AFI Plan	AFI PLAN SC	ICAO	31 May 2022 then continuously	
	15. Support and participate in HR initiatives in the region	AFI PLAN SC			
IV. Post COVID-19 restart, resilience and sustainability	16. African ANSPs cooperative preventive and corrective measures to a global/regional service disruption environment	ANSPs CAN SO	GCAA	Continuously	
	17. Implement ICAO CART recommendations and Take-off Guidance Documents pertaining to ANSPs	ICAO AFCAC Other partners			

V. Contribution of African ANSPs to the implementation of the Joint Priory Action Plan for the operationalization of SAATM (JPAP)	18. Building a seamless Sky through the modernization and interoperability of systems and equipment, the harmonization of procedures, the pooling of resources and leveraging on existing experiences and initiatives for cooperative management of airspace.	ANSPs ICAO	ASECNA/AFCAC	Ref. implementation roadmap	
	19. Facilitate connectivity through effective implementation of relevant JPAP Pillars	AFCAC Other partners	AFCAC	Ref.. implementation roadmap	
	20. Support to States’ participation to SAATM	ANSPs	AFCAC	Ref. implementation roadmap	
VI. Air Navigation System Planning, Implementation, Monitoring, Performance Measurement and Reporting	21. ANSPs effective participation in APIRG Projects	ANSPs ICAO Other partners	ASECNA ATNS GCAA KCAA UCAA	30/11/2022-APIRG/25	Ref to APIRG Projects led by ANSPs
	22. Addressing Air Navigation Deficiencies identified by APIRGs, Gap Analysis, ANSPs Peer Reviews, and/or other mechanisms	ANSPs	ICAO	30/11/2022-APIRG/25	
	23. Uniform reporting on AFI AANDD				
	24. Sharing of knowledge and experience in emerging air navigation applications and technologies (AIDC, AMHS, VoIP, SBAS, ADS-B- <i>Space &Ground based</i> etc.)	ANSPs ICAO Other partners	ASECNA	30/11/2022-APIRG/25	MoUs to be concluded
	25. Support ICAO Position for ITU WRCs based on surveys, studies, reports, in coordination with national CAAs and Telecommunications Regulatory Authorities.	ANSPs ICAO Industry	ICAO	30/10/2023	
	26. Develop ANSPs’ ATM Master Plans compliant with the Regional and National Air Navigation Plans	ATNS ASECNA IATA ICAO	ICAO	30/11/2022-APIRG/25	Rf. Conc.24/05 APIRG/24
	27. Coordinate identification and implementation of enabling technologies in consultation with the industry	ANSPs ICAO Industry	ATNS & ASECNA	Continuous	
	28. Cooperate in Research and Development and Innovation				
VII. Next meetings	29. Steering committee of ANSPs meeting (every year) 30. Next ANSPs meeting (2 years) in 2024, with hoisting ANSP to be identified by the AASG	ASECNA ATNS	ASECNA	31/12/2022	



THANK YOU

PANELISTS



**Boukari Abari
Bouzoua**

SMS Senior Officer
ASECNA



**William
Amaoako**

Safety & Standards
Ghana Civil Aviation
Authority



Richard Ruhesi

Director Air Navigation
Services
Uganda CAA



Ernesto Manhica

Director of Operations
and Air Navigation
Aeroportos de
Moçambique E.P.

IMPLEMENTATION STATUS OF THE AFRICAN ANSP PEER REVIEW MECHANISM – THE TRANSITION PHASE BEYOND SMS



THANK YOU

FATIGUE MANAGEMENT AND THE IMPACT ON OPERATIONAL TEAMS

FACILITATOR



Bill Middleswart

Safety Programme Manager

CANSO

GUEST SPEAKER



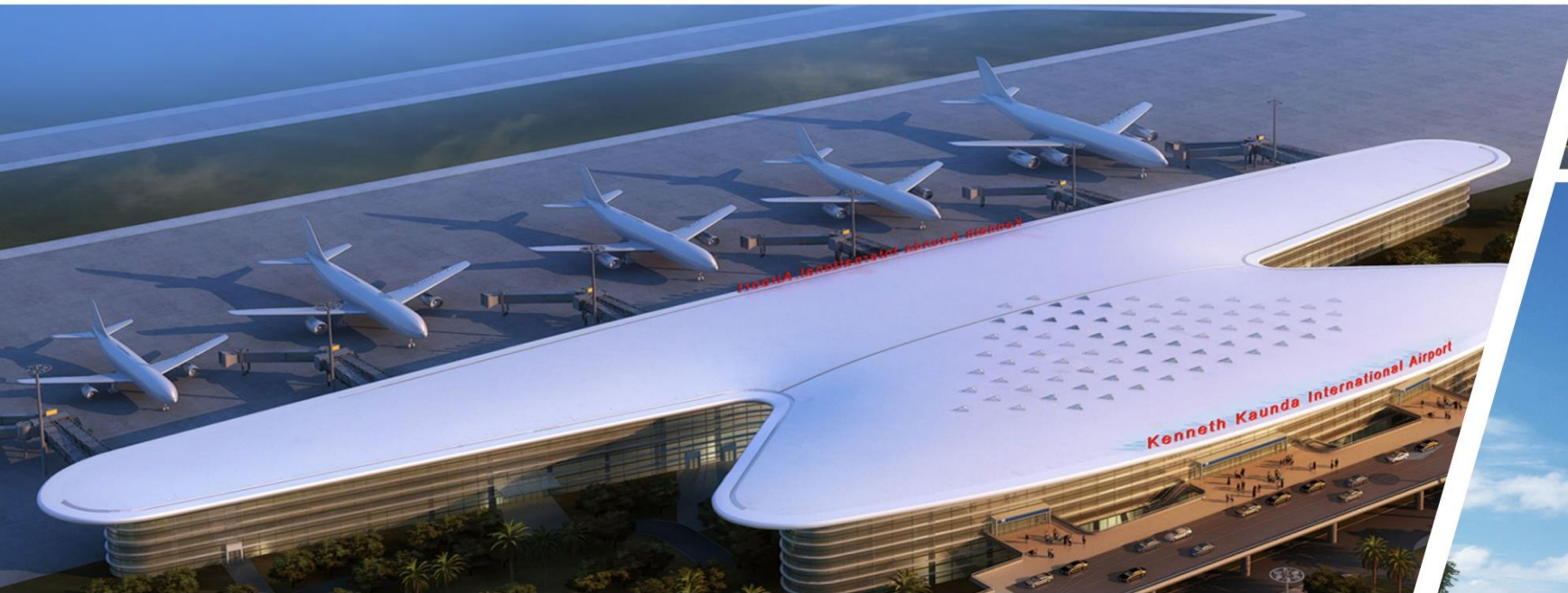
Maggie Kaunda

Acting Managing Director
Zambia Airports Corporation Ltd

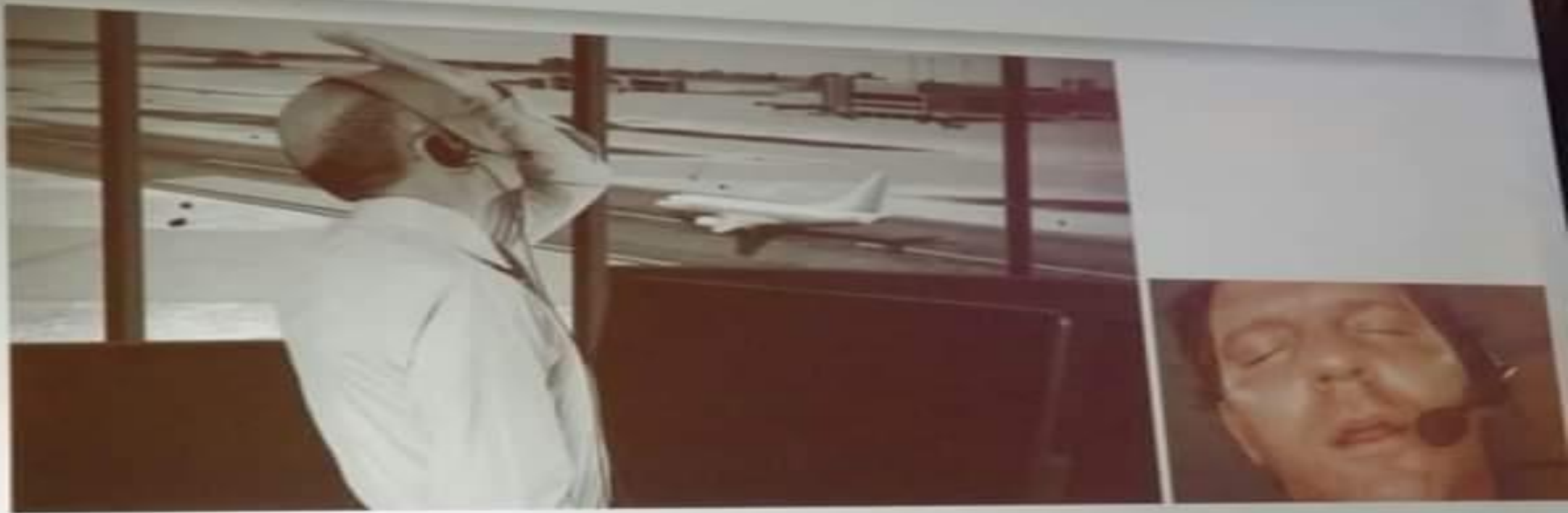
FATIGUE MANAGEMENT ZACL PERSPECTIVE

- INTRODUCTION AND GENERAL OVERVIEW OF FATIGUE
- FATIGUE SYMPTOMS AND CAUSES
- FATIGUE MANAGEMENT – ZACL

INTRODUCTION – VISION AND MISSION



INTRODUCTION - FATIGUE



FATIGUE - SYMPTOMS



IMPACT OF FATIGUE ON OPERATIONS



FATIGUE MANAGEMENT – ZACL

FATIGUE MANAGEMENT

Fatigue will affect your alertness, your performance, your health, your mood and **your safety.**

- GET PLENTY OF **SLEEP**
- TAKE FREQUENT **BREAKS**
- EAT REGULAR **HEALTHY MEALS**
- STAY **HYDRATED**
- **EXERCISE** AND GET PLENTY OF FRESH AIR

WARNING SIGNS OF FATIGUE

- Inability to keep eyes open
- Poor concentration
- Drowsiness, head-nodding
- Slow reaction time
- Increased irritability
- Constant yawning



Presenter:



Organiser: **CANSO**

Host:



FATIGUE INTERVENTION - Technology



FATIGUE MANAGEMENT – STATE LEVEL

REGULATIONS ABOUT FATIGUE

Fatigue is a major cause for concern in the transport and haulage industry.

Under Safe Work Australia, organisations must adhere to a stringent set of laws dictating the handling of fatigue management.

nationalheavyhaulage.com.au

Presenter:



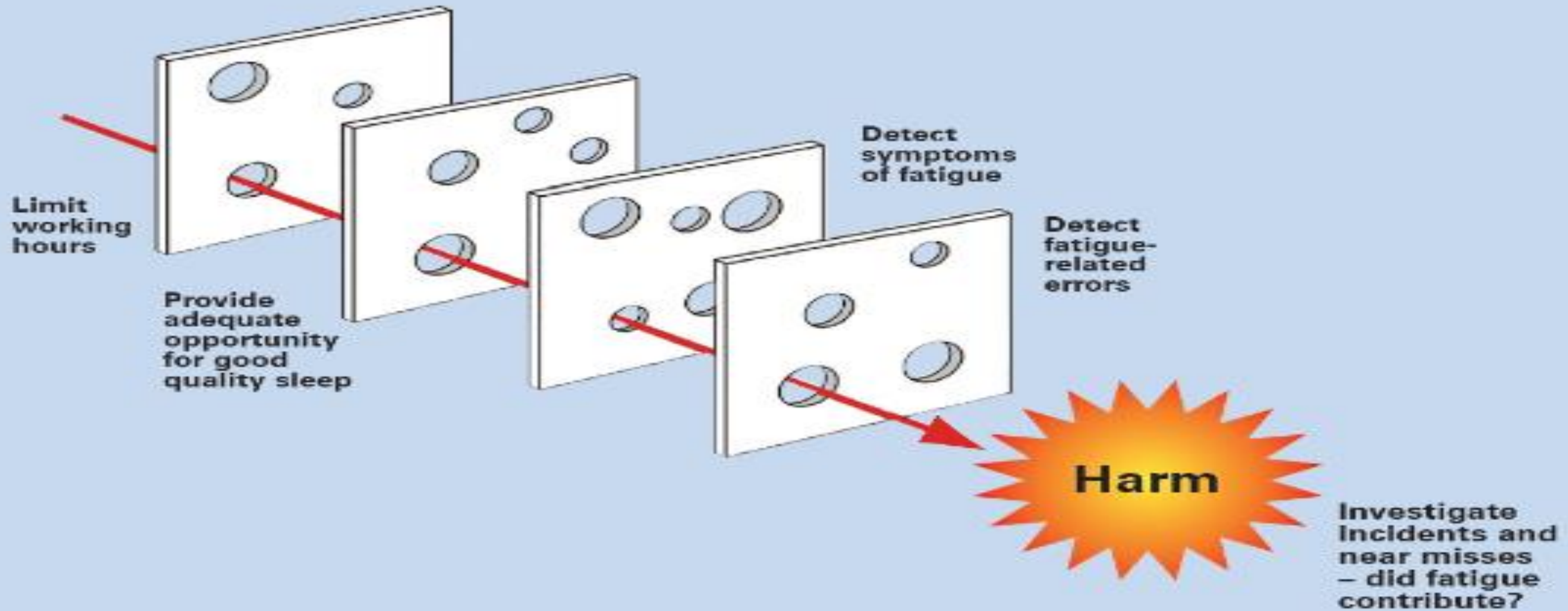
Organiser: **CANSO**

Host:



CONCLUSION

Figure 1 – Fatigue management layers of defence





THANK YOU

FATIGUE MANAGEMENT AND THE IMPACT ON OPERATIONAL TEAMS



**Matita
Tshabalala**

Human Factors Specialist
ATNS



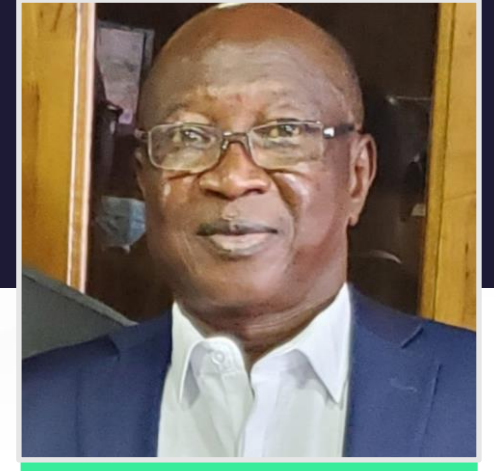
Osman Saafan

Global Chair CANSO
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Chief ATM Officer
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Authority



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Soumah**

Secretary General/CEO
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