
ICAO
SAFE SKIES.
SUSTAINABLE
FUTURE.

ICAO ESAF/WACAF Regional Office UAS/RPAS Workshop

Nairobi, Kenya
June, 2025

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Considerations about BVLOS UAS Operations (BVLOS)

Objectives

- Understand the BVLOS Operations Features;
- Understand the Possible BVLOS Enablers ;
- Understand the stakeholders' part in implementing and benefiting from BVLOS Operations;
- Discuss Practical Applications;
- Enable Safe & Legal BVLOS Operations.

BEYOND VISUAL LINE OF SIGHT (BVLOS)

** FPV*

UAS OPERATIONAL EMPLOYMENT:

- Infrastructure Inspection,
- Humanitarian Aid,
- Goods Delivery,
- Crop Monitoring
- Area Surveillance,
- Search and Rescue
- …
  - ✓ **VAST RANGE / ENHANCE EFFICIENCY,**
  - ✓ **DIFFERENT FRAMEWORKS,**
  - ✓ **DIFFERENT OPERATIONAL PROFILES.**

REMOTE AIRCRAFT "OUT" OF THE PILOT`S SIGHT

BEYOND VISUAL LINE OF SIGHT (BVLOS)

DESPITE THE POSITIVE OUTCOMES, IT POSES CHALLENGES:

- NOT MENACE TO AVIATION SAFETY LEVELS,
- NOT MENACE TO PEOPLE AND PROPERTIES ON THE GROUND,
- AIRSPACE SURVEILLANCE/IDENTIFICATION,
- CONSPICUITY FOR OTHER AIRSPACE USERS,
- HAZARDS AVOIDANCE (WEATHER, OBSTACLES, AIRCRAFT),
- REMOTE PILOT`s SITUATIONAL AWARENESS (SA)
- ….

DISREGARD SAFETY – BAD RESULTS

BEYOND VISUAL LINE OF SIGHT (BVLOS)

National Transportation Safety Board
Aviation Incident Final Report

Location:	Hoffman Island, NY
Date & Time:	09/21/2017, 1920 ED
Aircraft:	DJI Phantom
Defining Event:	Midair collision
Flight Conducted Under:	Part 107: Small UAS

Analysis

The United States Army UH-60M helicopter was o
mean sea level (msl) when it collided with a privat
(sUAS). The helicopter sustained minor damage ar
helicopter saw the sUAS before impact and immed
collision.

https://www.ntsb.gov/investigations/Pages/DCA17IA202AB.aspx

Aviation Investigation Final Report

Location:	Daytona Beach, Florida	Accident Nur	
Date & Time:	December 30, 2023, 14:04 Local	Registration:	
Aircraft:	ROBINSON HELICOPTER R44 (A1); DJI Mavic 2 (A2)	Aircraft Dam	
Defining Event:	Midair collision	Injuries:	
Flight Conducted Under:	Part 91: General aviation - Other work use (A1); Part		

Analysis

The pilot of the helicopter reported that while flying at an indicated
ft, while on approach to land at an off-airport landing zone, he saw
aerial system (UAS)] in front of his windscreen. He attempted to av
and the UAS impacted the main rotor resulting in substantial dama
The pilot reported that there were no preaccident mechanical malfu
helicopter that would have precluded normal operation.

https://data.ntsb.gov/carol-repgen/api/Aviation/ReportMain/GenerateNewestReport/193587/pdf

Man dies after being struck by drone in southern Vietnam

Tuesday, November 26, 2024, 14:02 GMT+7

The scene of a fatal incident where a man was killed in a collision with a drone in Kien Giang Province, southern

https://tuoitrenews.vn/news/society/20241126/man-dies-after-being-struck-by-drone-in-southern-vietnam/83107.html

DISREGARD SAFETY – BAD RESULTS

BEYOND VISUAL LINE OF SIGHT (BVLOS)

BVLOS ASSUMPTIONS:

- PRESERVE EXISTING LEVELS OF AVIATION SAFETY,
- NOT INTRODUCE NEW UNACCEPTABLE SOCIETAL RISKS,
- NOT IMPOSE OTHER UNDESIRABLE IMPACTS ON SOCIETY (E.G. PRIVACY, ENVIRONMENTAL),
- DELIVER THE VALUE THEIR STAKEHOLDERS SEEK,
- PROFIT OR REDUCTION OF COSTS (OR THE FUTURE PROMISE OF), OR
- SOCIETAL, HUMANITARIAN, ENVIRONMENTAL BENEFITS (GOVERNMENT OR NOT-FOR PROFIT CONTEXT)

BEYOND VISUAL LINE OF SIGHT (BVLOS)

BVLOS OPERATIONAL PROFILE X ASSOCIATED RISKS

- POPULATED AREAS (RISK FOR PEOPLE/PROPERTIES)
- DENSITY AIRSPACE (RISK FOR OTHER AIRCRAFT)
- REMOTE AREAS
- FLIGHT TIME
- FLIGHT PROFILE
- WEATHER

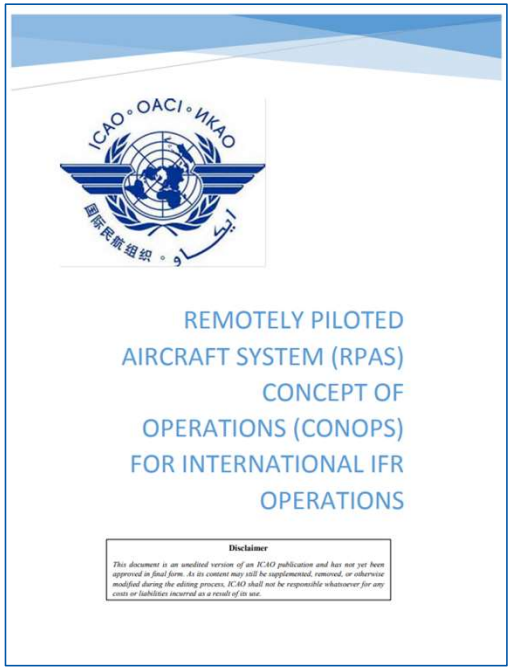
BVLOS X C2 LINK X ASSOCIATED RISKS:

- BVLOS – RLOS (RADIO LINE OF SIGHT)
  - "DIRECT LINK"
- BVLOS – BRLOS (BEYOND RADIO LINE OF SIGHT)
  - RELAY NODs

BEYOND VISUAL LINE OF SIGHT (BVLOS)

ICAO – Remotely Piloted Aircraft System (RPAS) Concept Of Operations (CONOPS) for International IFR Operations:

- ✓ SEGREGATED AIRSPACE – Airspace of specified dimensions allocated for exclusive use to a specific user(s)
- ✓ ACCOMMODATED – ……..can operate along with some level of adaptation or support that compensates for its inability to comply with existing operational constructs……
- ✓ INTEGRATED – refers to a **future** when RPA may be expected to enter the airspace system routinely without requiring special provisions…….



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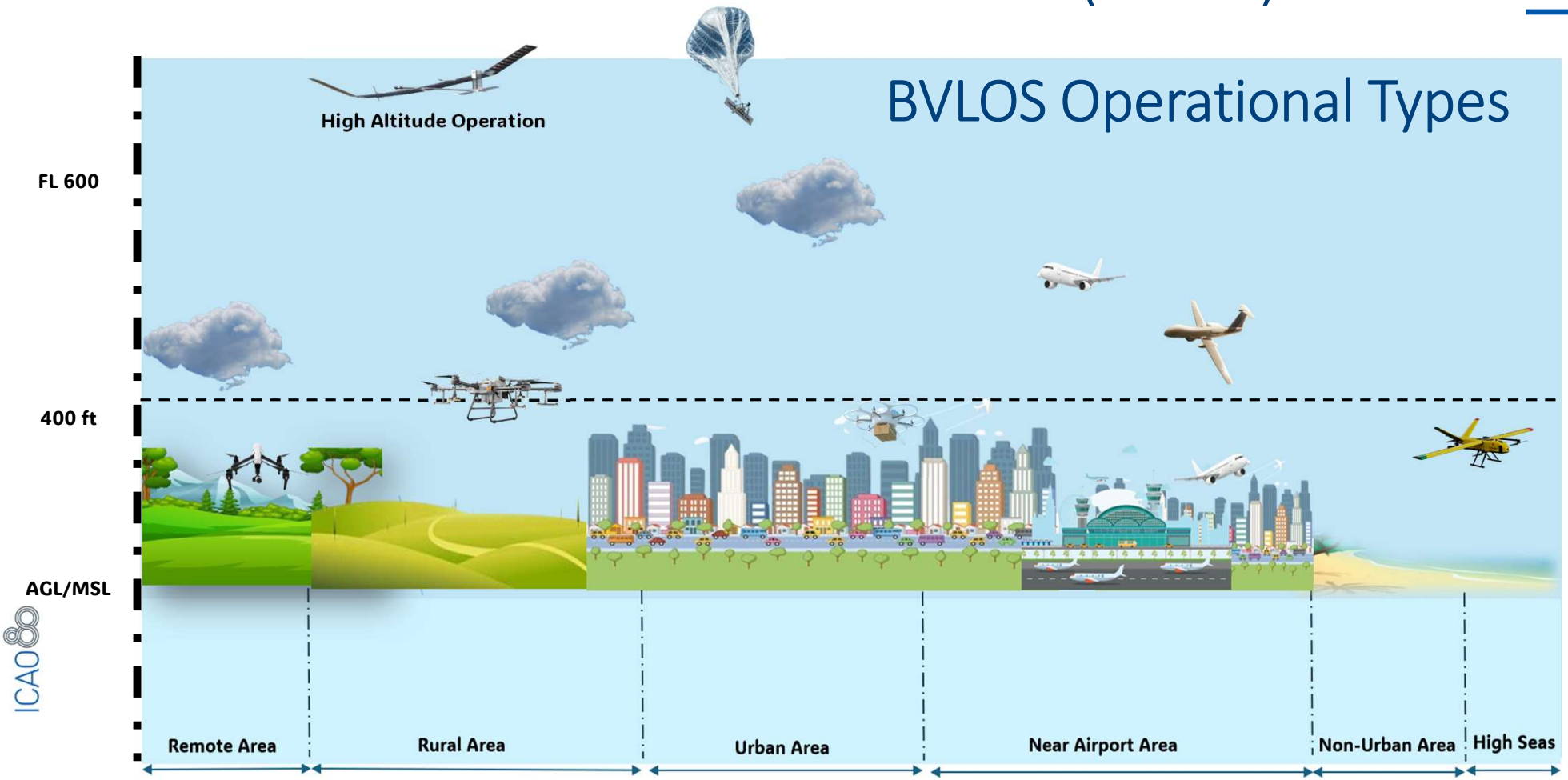
BEYOND VISUAL LINE OF SIGHT (BVLOS)



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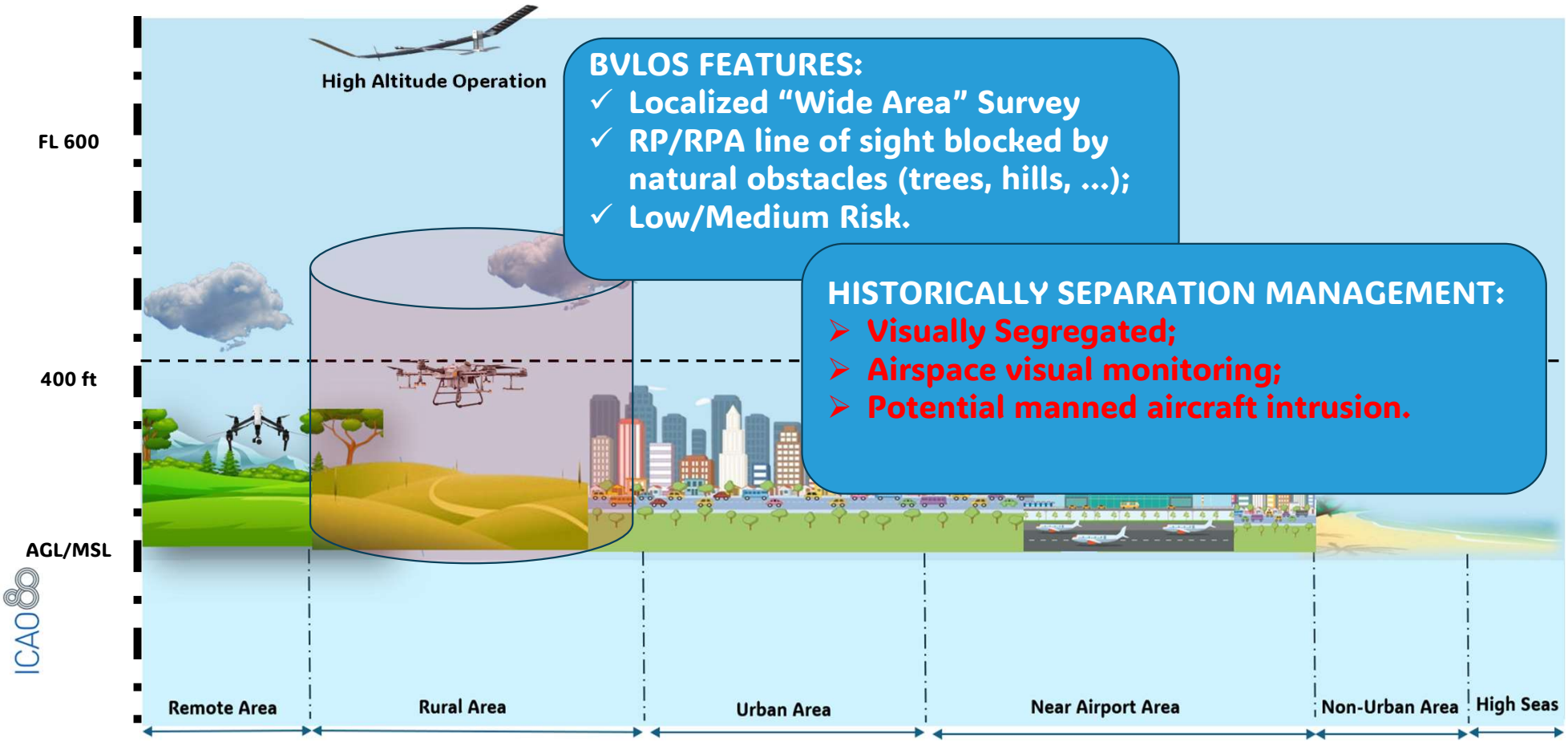

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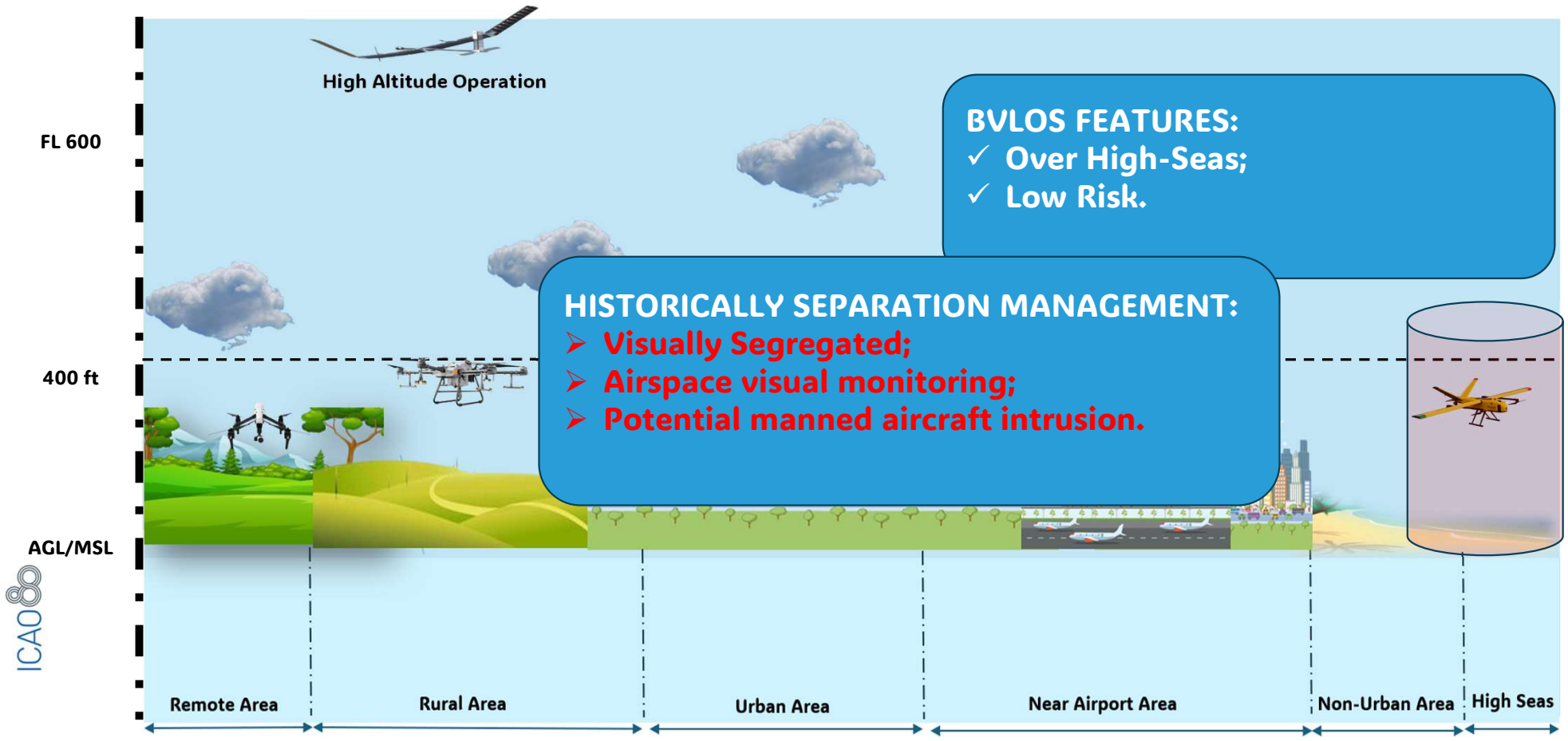

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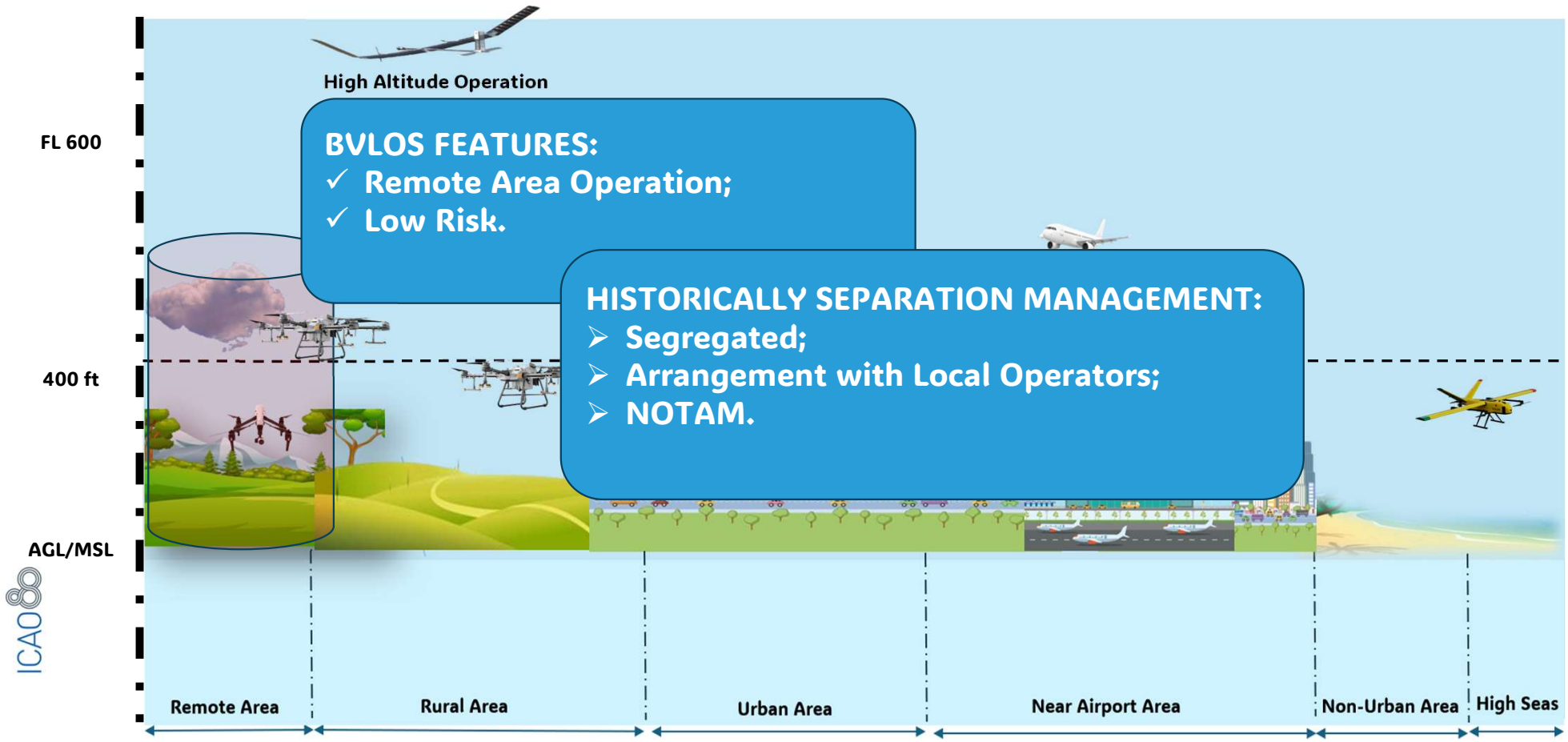

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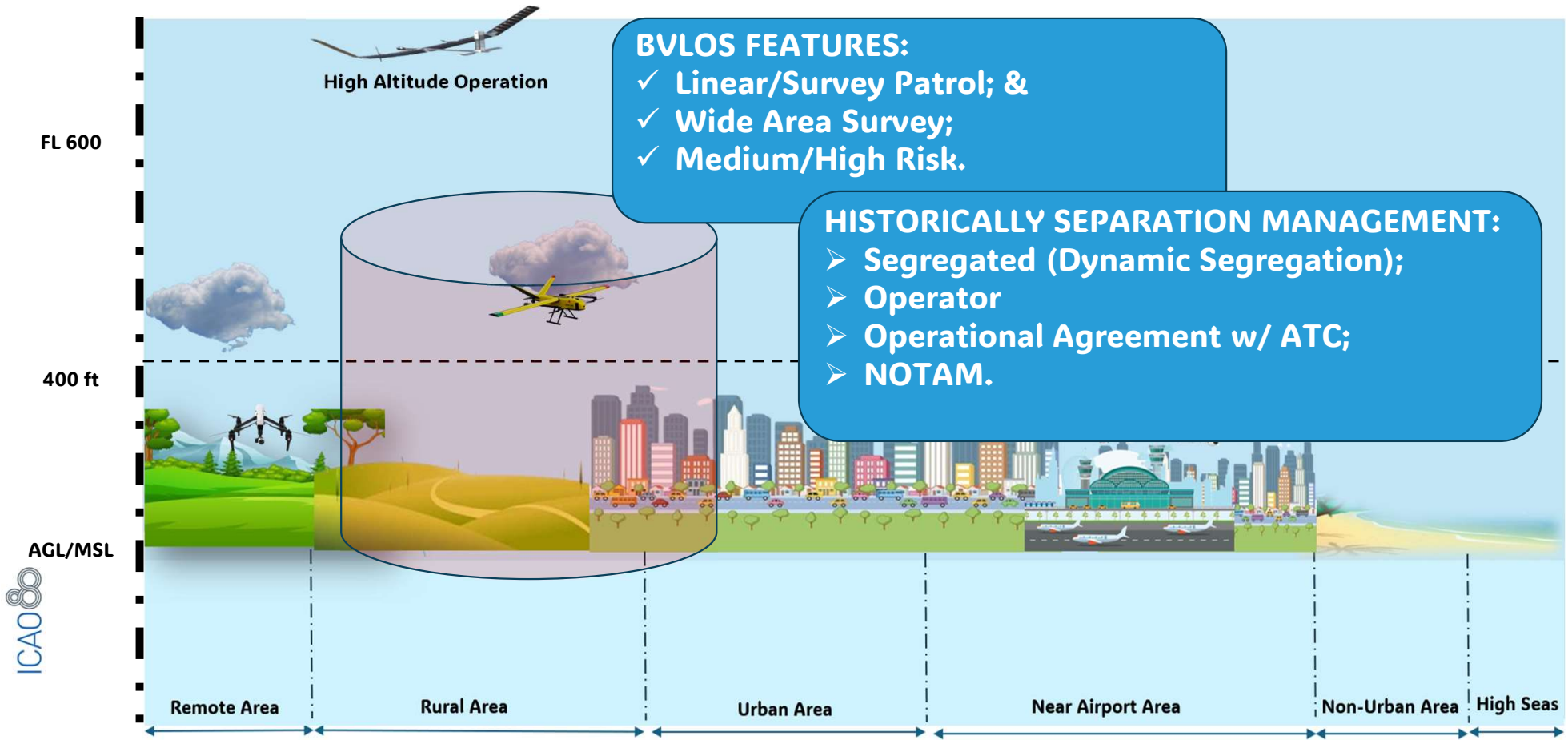

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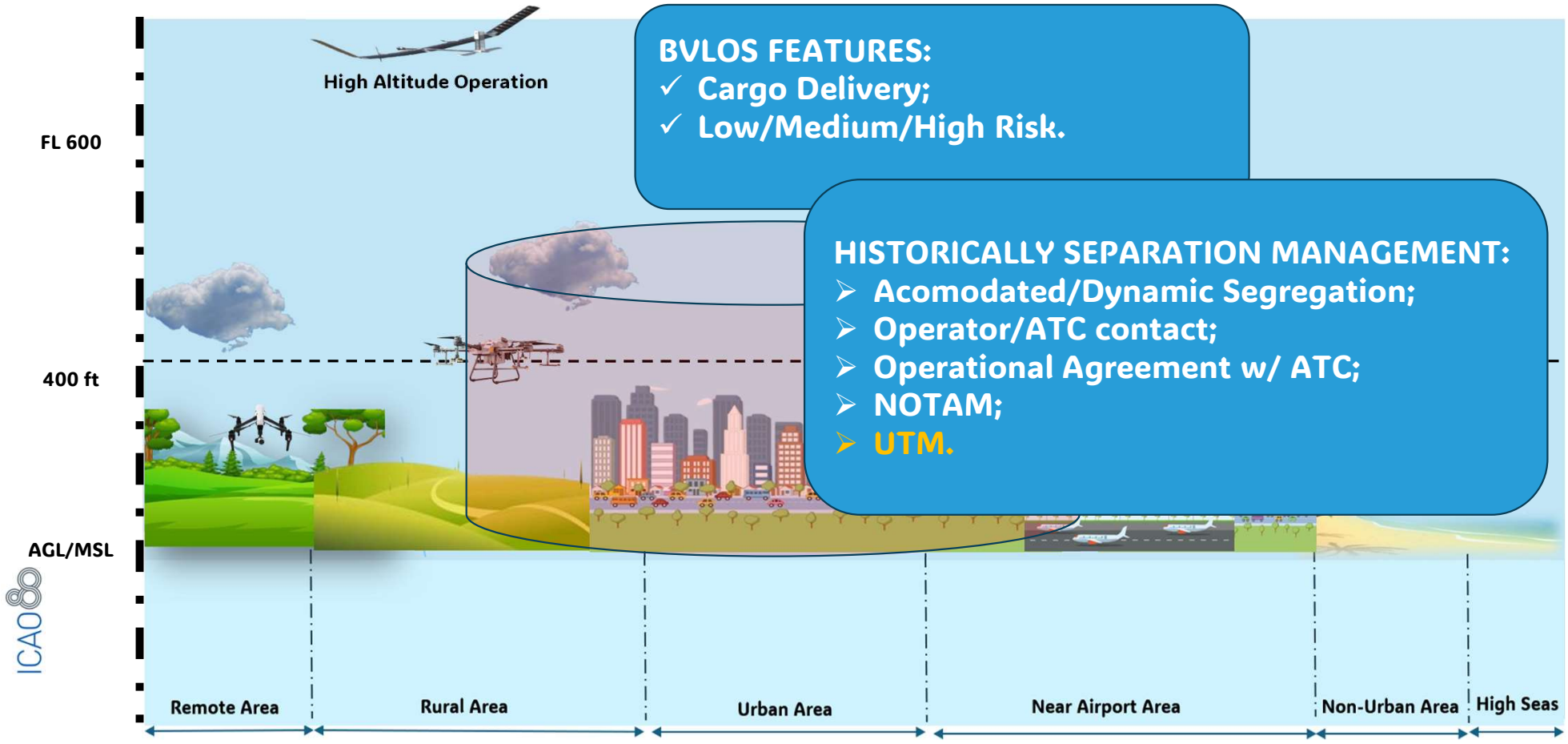

BVLOS FEATURES:
- ✓ Cargo Delivery;
- ✓ Low/Medium/High Risk.

HISTORICALLY SEPARATION MANAGEMENT:
- ➢ Acomodated/Dynamic Segregation;
- ➢ Operator/ATC contact;
- ➢ Operational Agreement w/ ATC;
- ➢ NOTAM;
- ➢ UTM.

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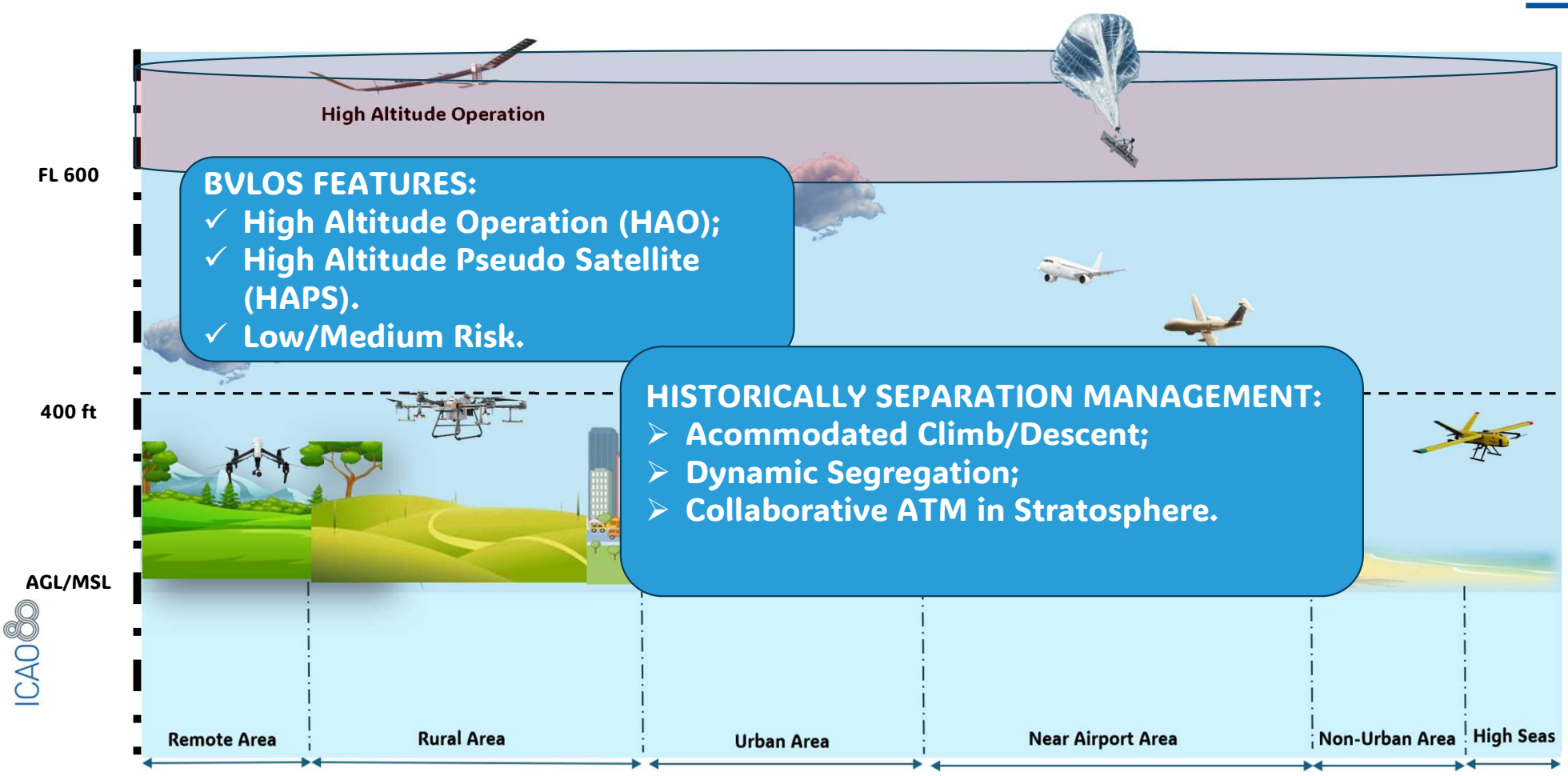
BEYOND VISUAL LINE OF SIGHT (BVLOS)



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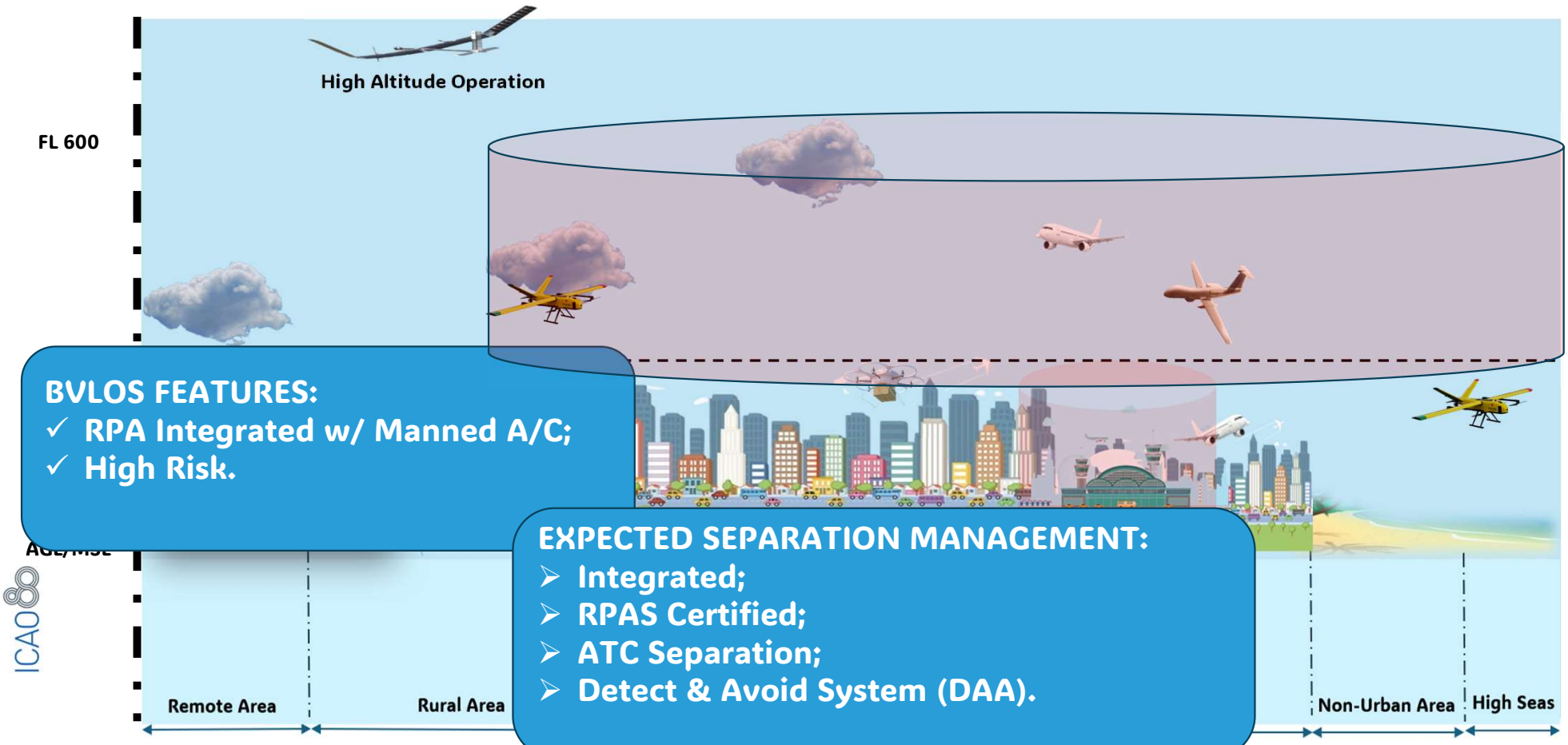


BVLOS FEATURES:

- ✓ RPA Integrated w/ Manned A/C;
- ✓ High Risk.

EXPECTED SEPARATION MANAGEMENT:

- ➢ Integrated;
- ➢ RPAS Certified;
- ➢ ATC Separation;
- ➢ Detect & Avoid System (DAA).

BEYOND VISUAL LINE OF SIGHT (BVLOS)

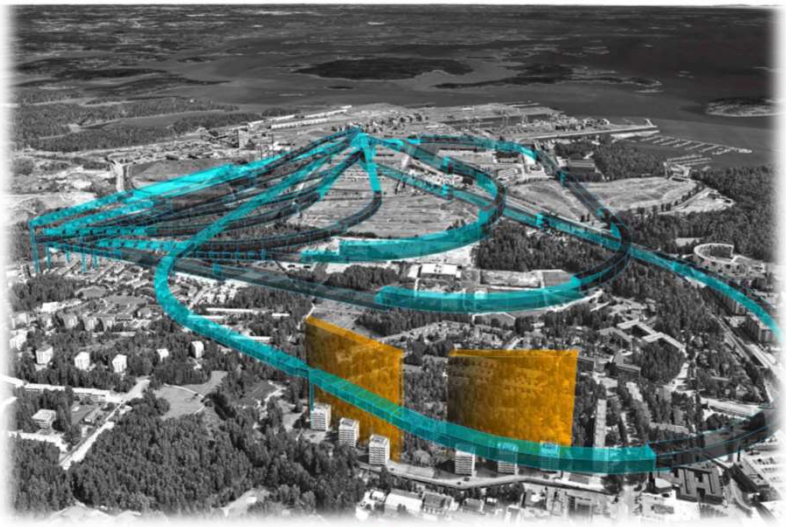
BVLOS X POSSIBILITIES

- UNMANNED/REMOTE AIRCRAFT
  - “CERTIFIED”/”TESTED”
  - FAILSAFE EMERGENCY SYSTEMS
  - STANDARD OPERATIONAL PROCEDURE (SOP)/CHECK-LIST
- REMOTE PILOT/CREW
  - “CERTIFIED”
  - HEALTH CONDITIONS (Use of Psychoactive Substances)
- ORGANIZATIONAL FRAME
  - SAFETY MANAGEMENT SYSTEM (SMS)
  - QUALITY MANAGEMENT SYSTEM (QMS)
  - SAFETY/FATIGUE/C2 LINK OVERSIGHT SYSTEM
  - APPLICABLE DOCUMENTS/REGISTERS

BEYOND VISUAL LINE OF SIGHT (BVLOS)

BVLOS X POSSIBILITIES

- OPERATIONAL ISSUES
  - PRE-PLANNING (ROUTE, WEATHER, …)
  - RISK ASSESSMENT
  - FLIGHT PLAN
  - EMERGENCY/CONTINGENCY PLAN
  - ADEQUATE AUTHORIZATIONS
  - ROBUST/RELIABLE C2 LINK
  - C2 LINK COVERAGE IN THE OPERATIONS AREA
  - ADEQUATE ENDURANCE (FUEL, BATTERY, …)
  - GNSS ADEQUATE SIGNAL
  - SERVICE LEVEL AGREEMENT (SLA) – If Applicable
  - OPERATIONAL AGREEMENT (ANSP X OPERATOR)
  - ….



BEYOND VISUAL LINE OF SIGHT (BVLOS)

BVLOS (STATES & SYSTEMS)

- ✓ **GLOBALLY, STATES ALLOW BVLOS OPERATIONS,**
- ✓ **SOME STATES DEVELOPED SYSTEMS TO PROVIDE AUTHORIZATION/COORDINATION,**

BVLOS IS BEING CONDUCTED IN ALL CONTINENTS

BEYOND VISUAL LINE OF SIGHT (BVLOS)

ICAO TV

UAS BEYOND VISUAL LINE OF SIGHT OPERATIONS (BVLOS) - FOR REGULATORS 2020

This webinar is aimed at experienced aviation regulators with limited UAS exposure who are interested to learn more about BVLOS. Industry and others with a concern in how a regulator views BVLOS will also have an interest

BEYOND VISUAL LINE OF SIGHT (BVLOS)

HOW TO REGULATE BVLOS OPERATIONS IN MY STATE?

- ICAO GUIDANCE MATERIAL (PART 102, UTM FRAMEWORK, U-AID);
- INCORPORATE ICAO SARPs PROVISIONS; &
- CONSULT OTHER STATES' EXPERIENCES.

"While the application of the provisions of Annex 6, Part IV is clearly defined, States are encouraged to apply the SARPs contained herein for domestic RPAS operations, as appropriate. […] Annex 6, Part IV SARPs were largely developed based on operations under instrument flight rules (IFR). States are encouraged to apply the SARPs provided herein for domestic RPAS operations, as appropriate".

(Annex 6, Part IV, p. xix)

Thank You

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