

Supporting
European
Aviation



DEMETER overview

ICAO MID – PBN SG/7

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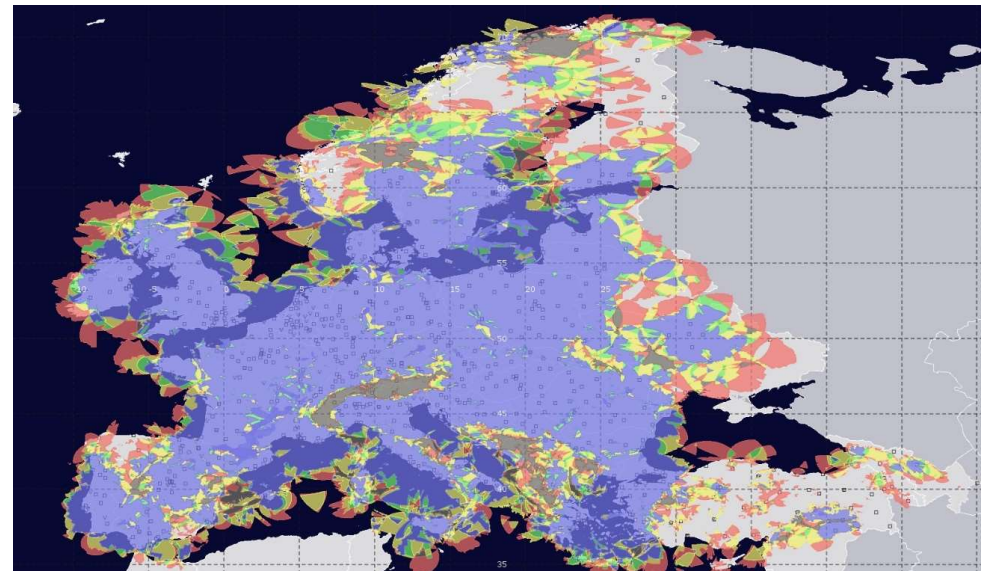


NETWORK
MANAGER



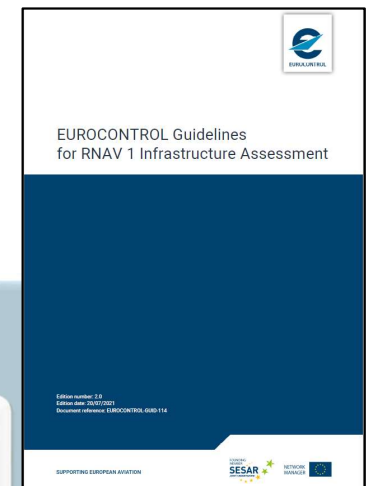
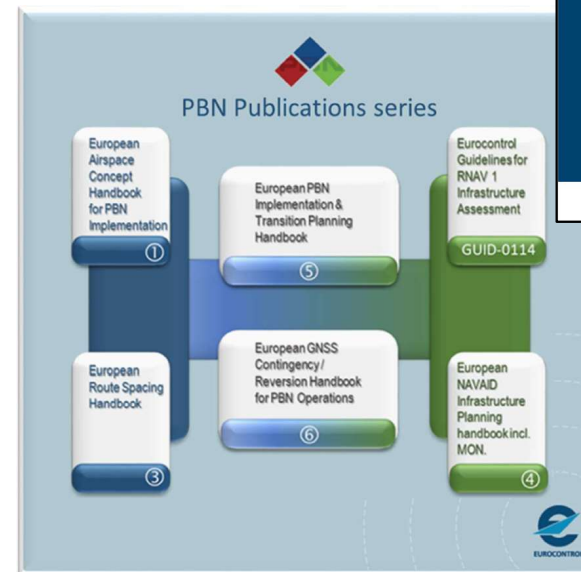
DEMETER - Distance Measuring Equipment Tracer

- Software tool for the infrastructure assessment for PBN Implementation
 - Focused on DME/DME performance assessment
 - VOR/DME coverage assessments also possible
- Enables cooperation between airspace planning, procedure design, NavAid engineering and flight inspection
- Supports cross-border collaboration and a harmonized implementation of RNAV procedures supported by ground infrastructure



Key Features (1)

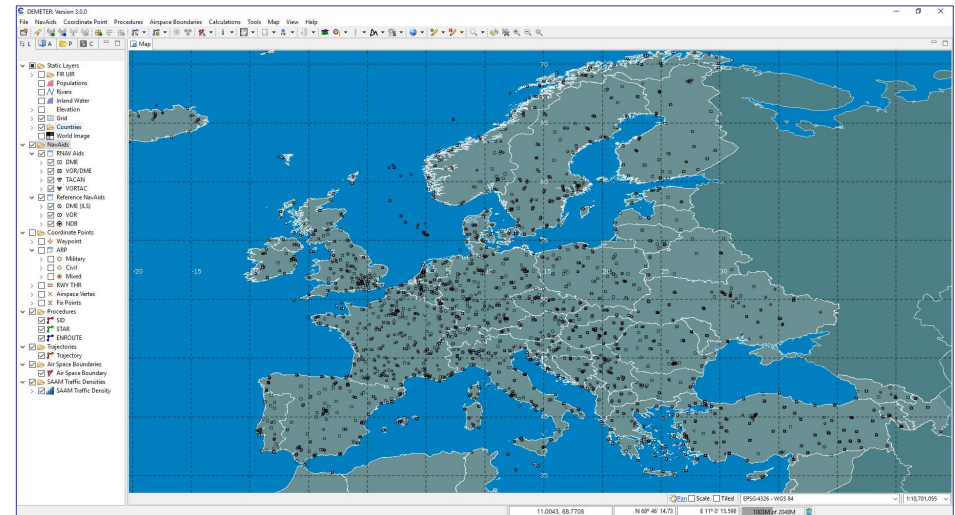
- Fully compliant with EUROCONTROL-GUID 0114 - Guidelines for RNAV 1 Infrastructure Assessment
 - Approved by ICAO NSP in 2008
 - Edition 2.0 issued in 2021
 - Part of the PBN Handbook Series
- Desktop application
 - Based on Open Source software platforms (no 3rd party license needed)
 - Signed with digital certificate
- The “standard” tool used by most ANSPs in Europe; may be used worldwide



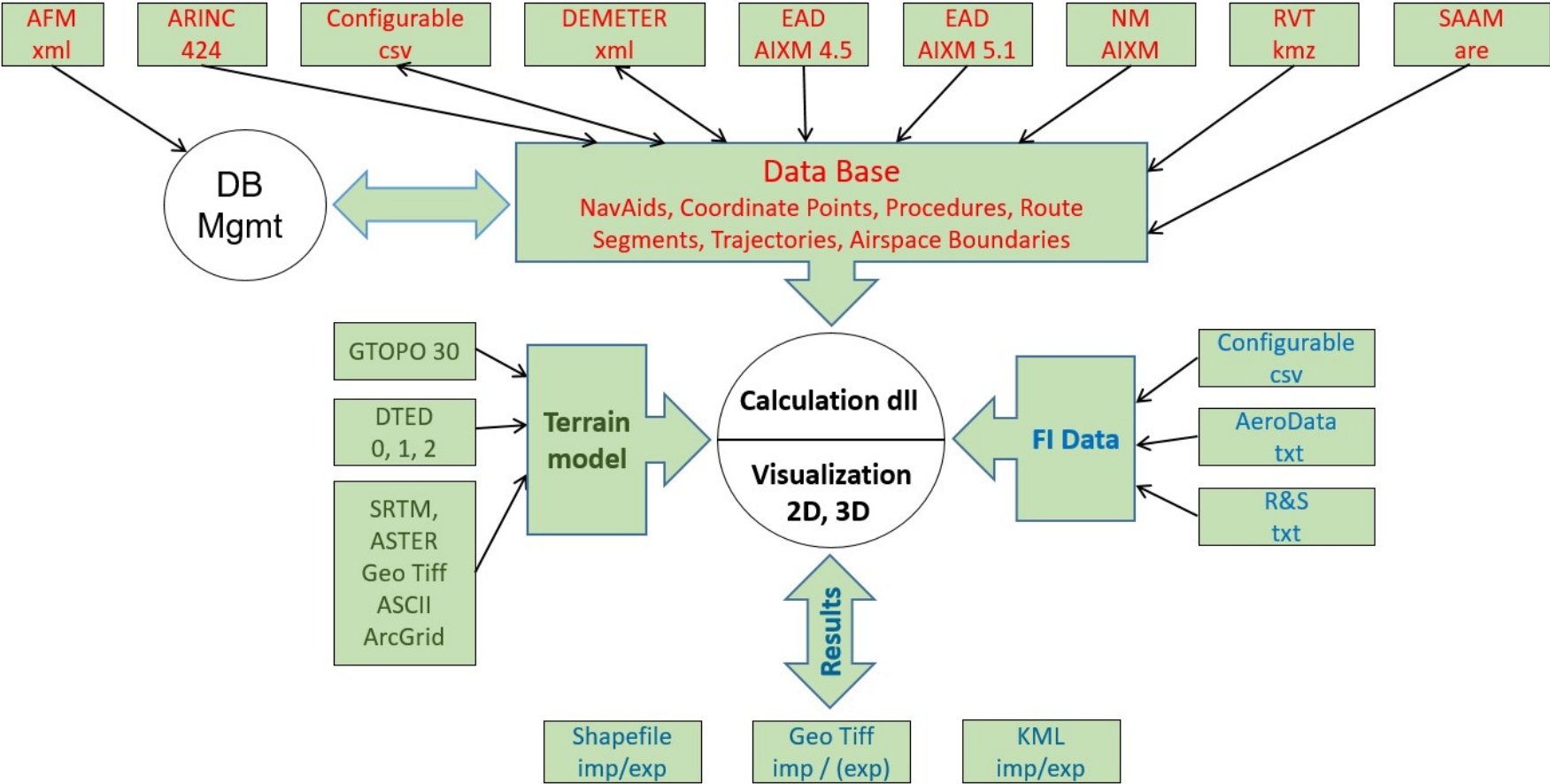


Key Features (2)

- Main inputs:
 - Nav aids and airspace elements data
 - Digital Terrain Model
- Main Outputs: coverage / RNAV performance plots
- Radio Line-of-Sight propagation model, considering occlusion by terrain
- Flexible interfaces for import/export of input data and simulation results
- Flight inspection data import and comparison with predicted coverage
- Various tools to support advanced simulations, results analysis, identification of issues and solutions



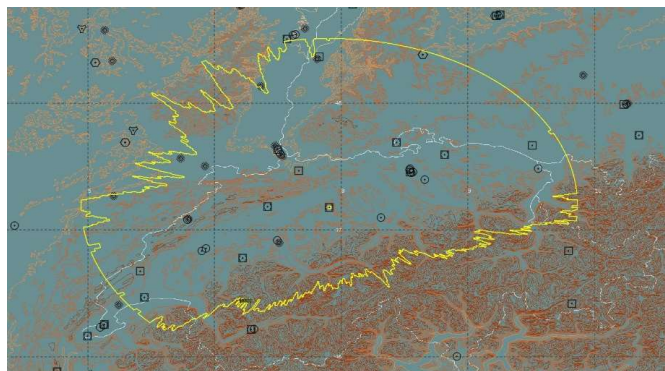
DEMETER Interfaces



Main simulation outputs – Area calculations

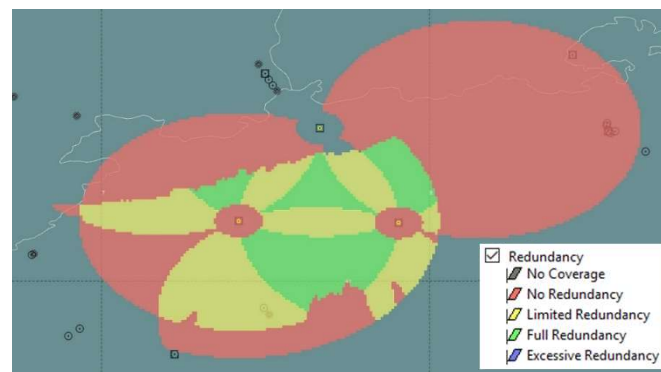
Coverage

- Single facility or multiple facilities (cumulative coverage)
- Single altitudes or a range of altitudes
- Coverage limited by:
 - Radio-line-of sight masking by terrain or Earth curvature
 - Designated Operational Coverage (DOC)



RNAV Performance

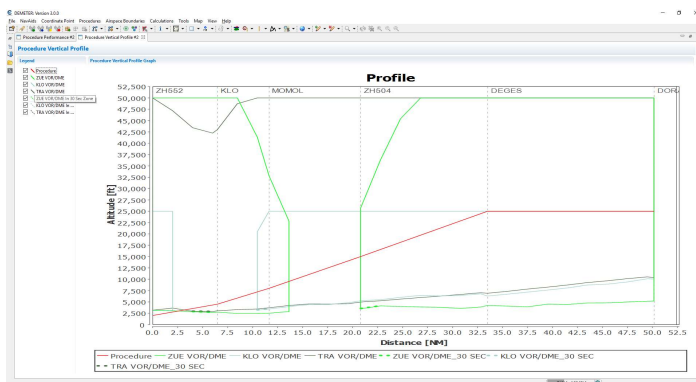
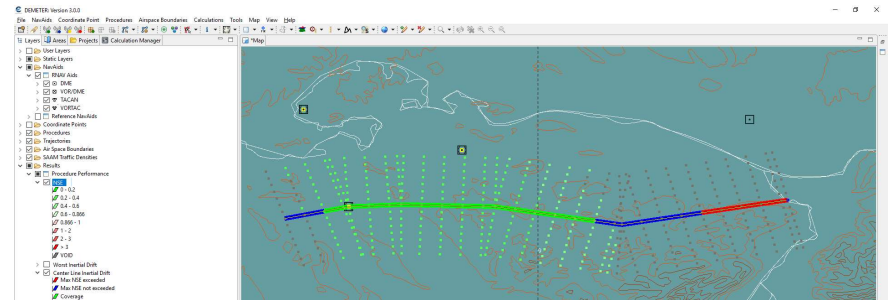
- DME/DME RNAV Performance
 - Redundancy,
 - Navigation Sensor Error
 - Subtended Angle
- VOR/DME RNAV Performance
 - Redundancy plot only



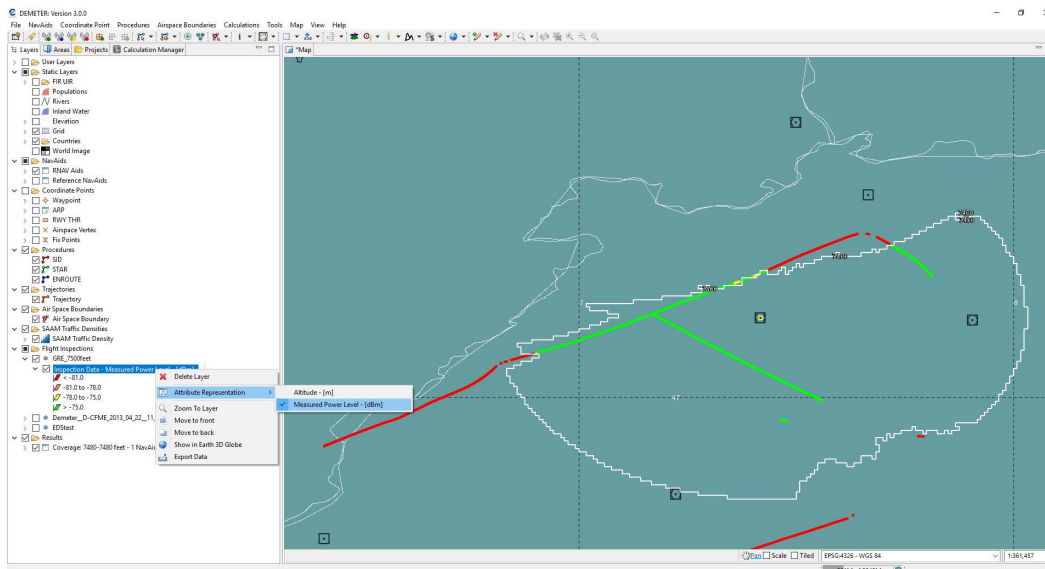
Main simulation outputs - Procedure Assessment

DME/DME RNAV Performance Calculation

- Interpolates over protection area semi-width
- Vertical profile determines simulation altitudes
- Redundancy and NSE displayed on 2D map and in correlated bar plots
- Inertial drift simulated in DME/DME gaps



Flight Inspection Interface

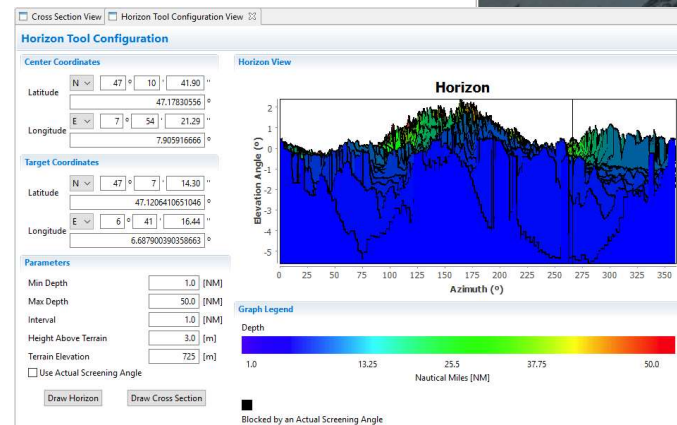
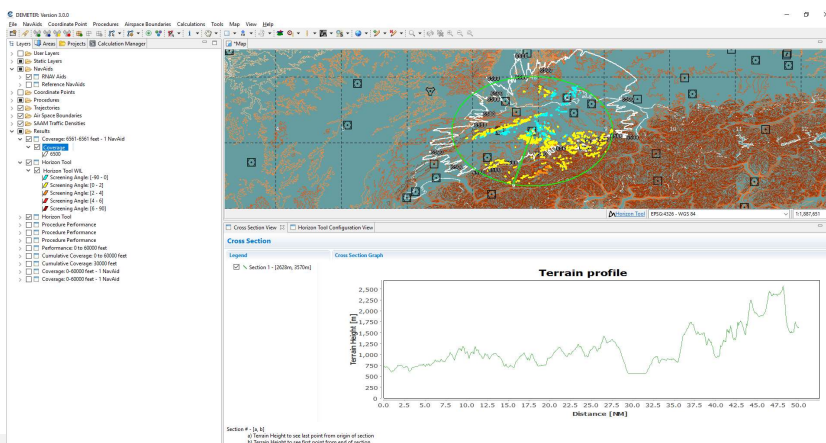
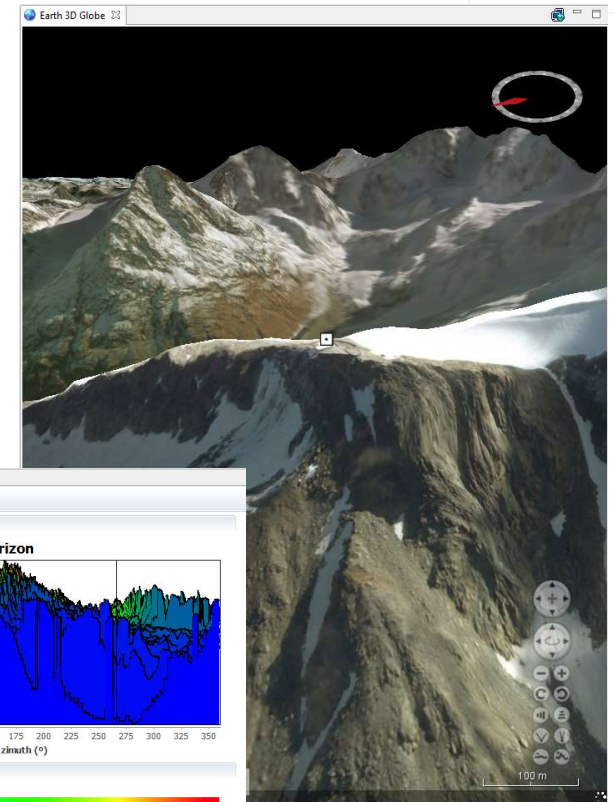


- Import flight inspection results back into DEMETER
 - Flexible .csv format and some widely used FIS formats accepted
 - Visualization on 2D Map (user defined styles)
 - Direct comparison between simulation and measured data

Planning Tools for NAVAID Optimization (1)

What can be done if coverage is insufficient?

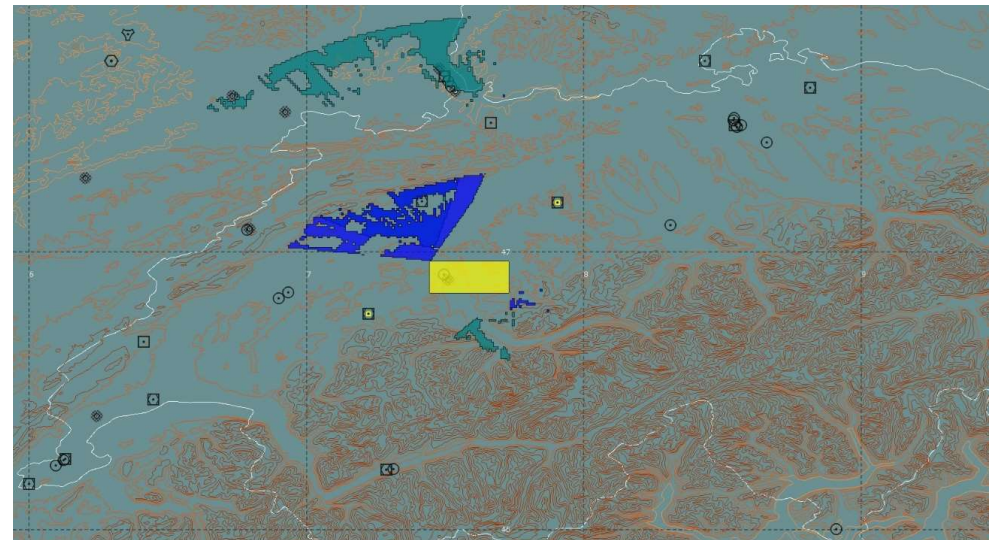
- Analyze coverage issues in detail – local optimization
 - Horizon tool to identify obstructing obstacles or summits
 - Cross section tool to identify suitable summits along a line of interest
 - 3D Map to visualize local context



Planning Tools for NAVAID Optimization (2)

What can be done if DME/DME coverage/performance is insufficient?

- Siting tool - identifies solutions for the optimization of DME network
 - Determines potential siting areas for new facilities to fill DME/DME coverage gaps
 - Analysis using only geometry constraints or geometry constraints plus visibility.
 - Further analysis needed to select the optimum solution



Other Support Tools (for reference)

Calculation Tools

- Coverage assessment tool
 - Takes into account diffraction, link budget calculations and different range limitations
- DME Pairs assessment / Critical DME
- Multipath tool
 - ellipse method to identify reflector locations
 - based on signal delay observed in flight inspection
- Barometric height calculation
- Logging functions
 - Configuration control & traceability
 - Debug for problem resolution

Map Tools

- Picture export for reports
- Extensive zooming and selection functions, area of interest
- Terrain grid visualization & indication of DTED level
- Distance and azimuth display
- Display of range rings
- Identify / Map Search
- Display of obstacle data
- Annotations
- Color configuration



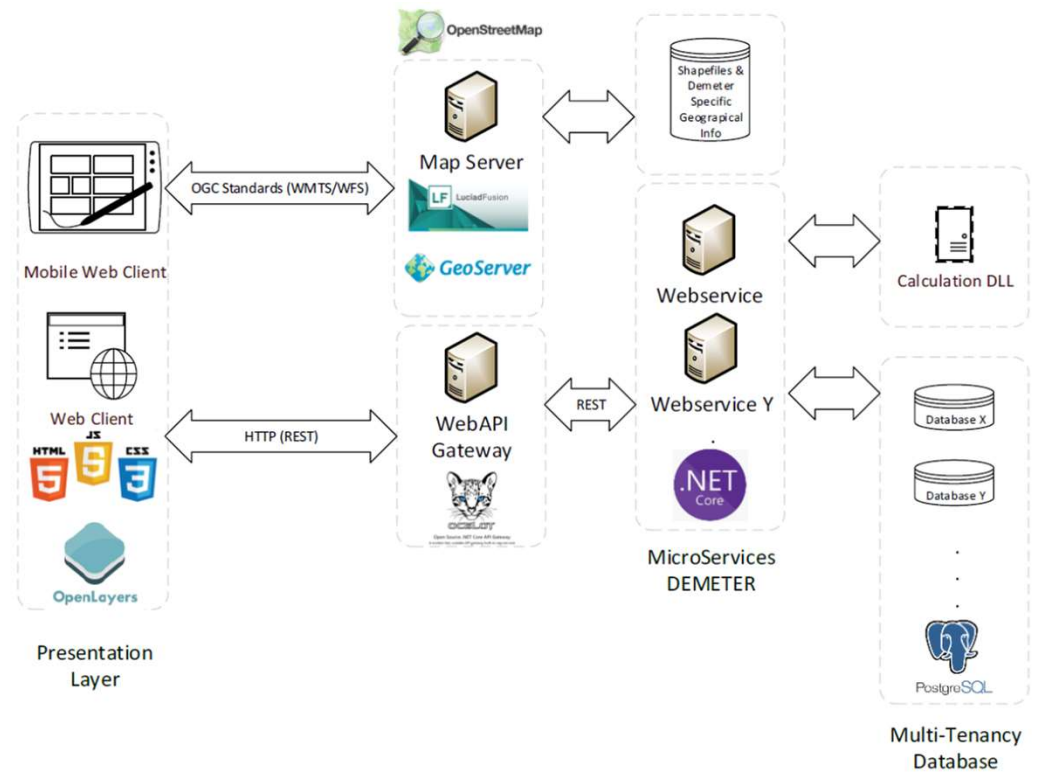
Distribution and Support

- Free for all State entities (NSA/CAA) and ANSPs in EUROCONTROL Member and Comprehensive Agreement States
- Fees apply to:
 - CAA/ANSP in Non-Member States (for internal use only)
 - 4,700 EUR one-off & 1,200 EUR annual fees
 - Other entities, e.g., DME manufacturers, System integrators, Procedure design services or for commercial use (providing services to third parties)
 - 9,500 EUR one-off & 1,425 EUR annual fees
- Signed License agreement required at organization level
- Training courses organized at the Aviation Learning Centre ([NAV DEM Intro](#), [NAV-DEM Adv](#))
- Contact and support: DEMETER@eurocontrol.int



DEMETER Web Based

- Avoid obsolescence issues and compatibility issues generated by current Desktop architecture
- Move from a “fat-client” to a “thin-client” architecture
- Proof of concept implemented, full migration on-going



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Thank you for attention!

