AIM/SWIM solutions for PBN needs

ICAO EUR PBN TASK FORCE & EUROCONTROL RAISG MEETING
Paris, France, 11 to 13 September 2013

Dr. Vadim Tumarkin
Head of AIS, Latvia

Presentation purpose

- Review latest developments related to optimum use of airspace in the Single European Sky
- Outline LGS AIM activities to meet ATM needs
- Present LGS AIM/SWIM prototype to support Latvian Airspace Concept development and implementation

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COMMISSION REGULATION (EU) No 677/2011

of 7 July 2011

laying down detailed rules for the implementation of air traffic management (ATM) network functions and amending Regulation (EU) No 691/2010

Article 1

Subject matter and scope

1. This Regulation lays down detailed rules for the implementation of air traffic management (ATM) network functions in accordance with Article 6 of Regulation (EC) No 551/2004 in order to allow optimum use of airspace in the single European sky and ensure that airspace users can operate preferred trajectories, while allowing maximum access to airspaces and air navigation services.

Airspace Users want to operate Preferred Trajectories

Airspace Design – Commission Regulation definition

Article 2

Definitions

For the purposes of this Regulation, the definitions in Article 2 of Regulation (EC) No 549/2004 shall apply.

In addition, the following definitions shall apply:

'airspace design' means a process to contribute to the achievement of network related performance targets and to cater for airspace users needs as well as to ensure or increase the established safety level and increase the airspace capacity and environmental performance through the development and implementation of advanced navigational capabilities and techniques,

Development and Implementation of advanced navigation capabilities and techniques

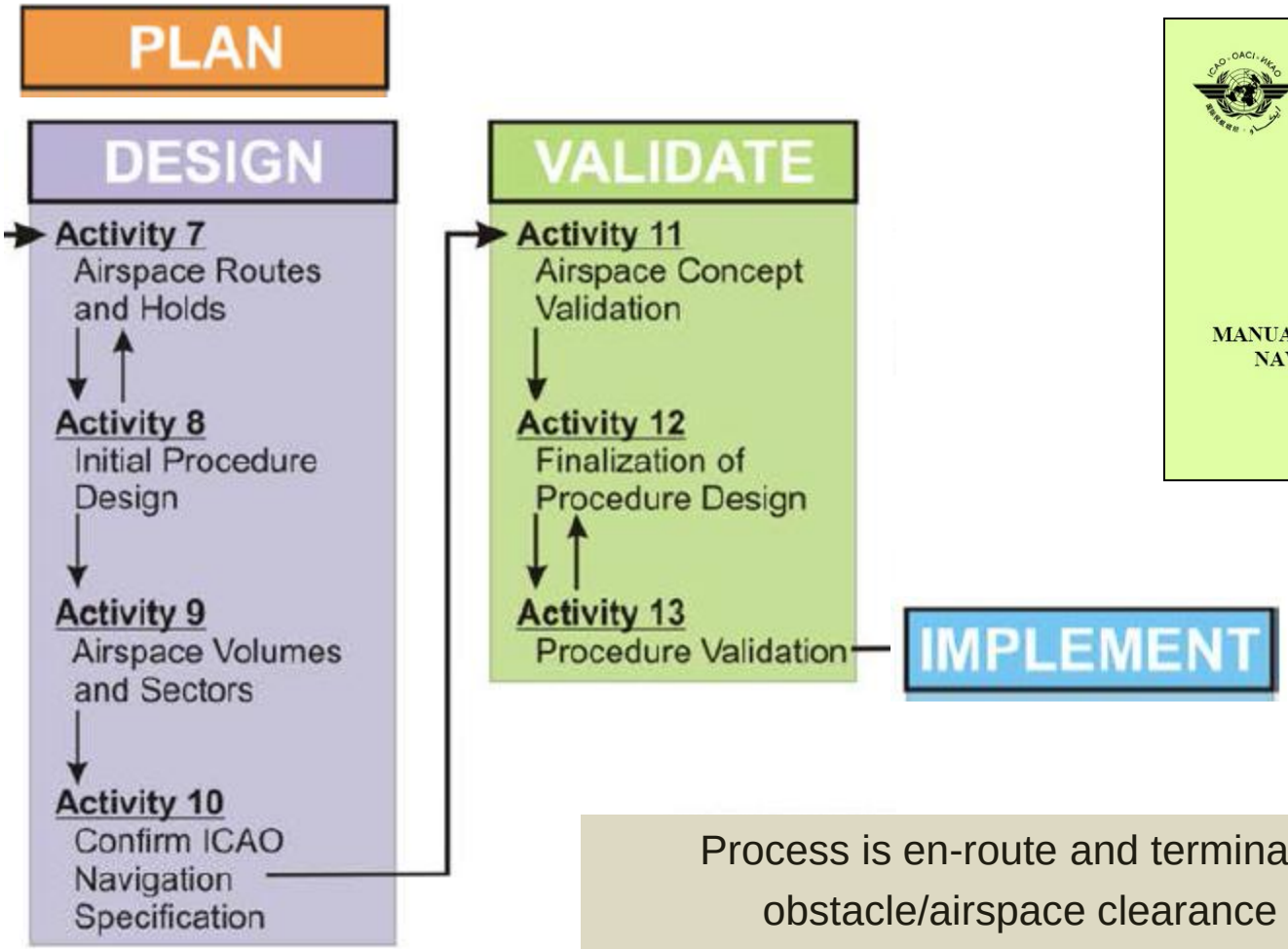
improved route networks and associated sectorisation, optimised airspace structures and capacity enhancing ATM procedures;

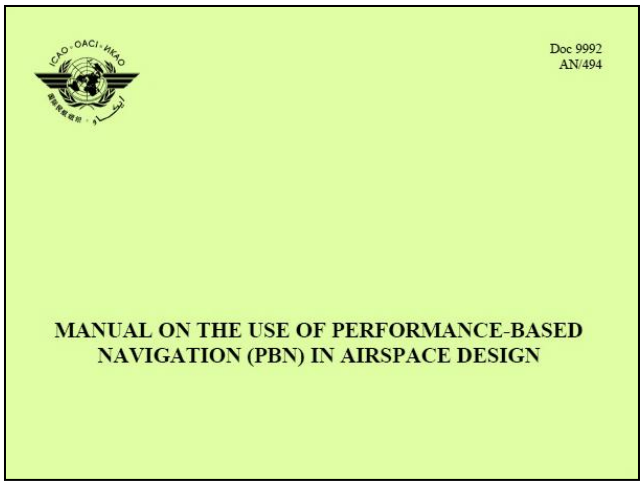
Route networks | Sectorisation | Airspace structure | ATM procedures

Airspace planners

Procedure designers

Airspace Design Phases



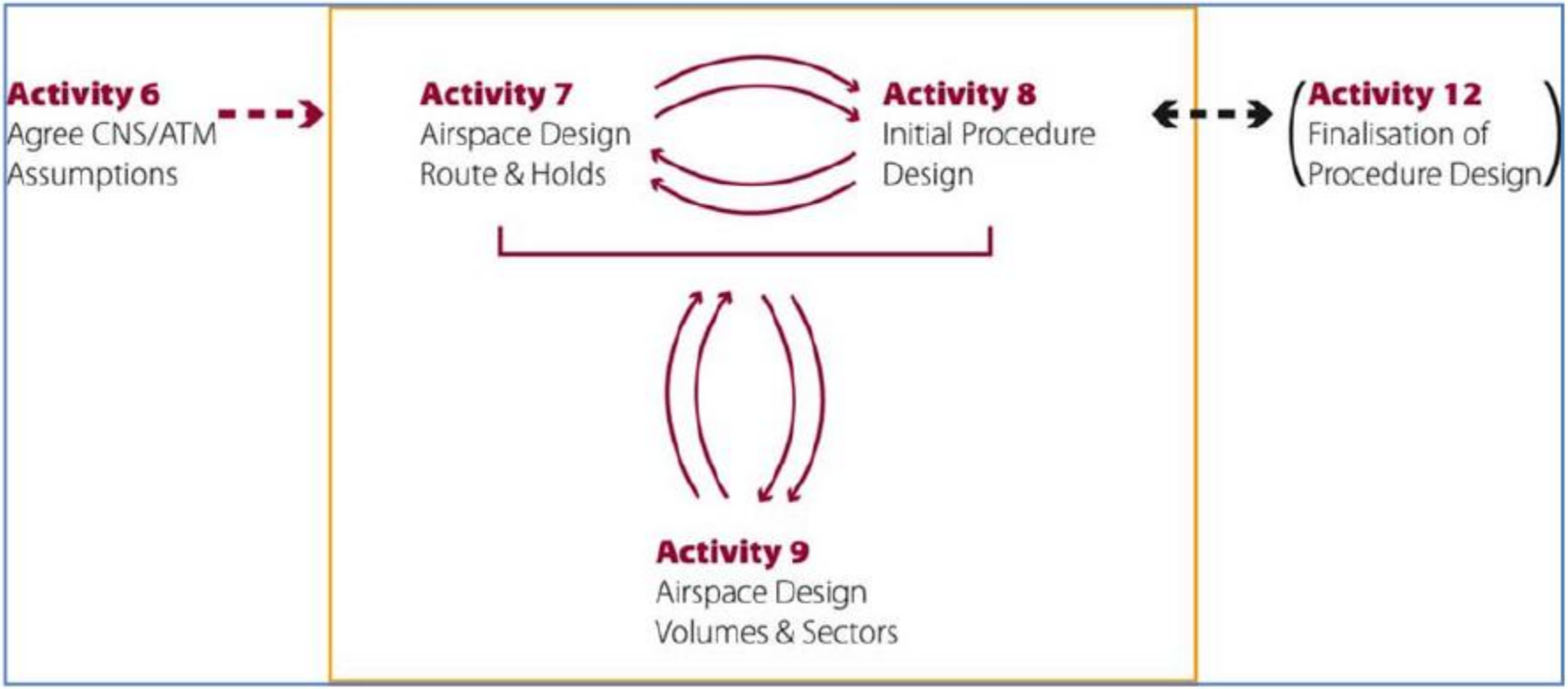


Process is en-route and terminal connected, obstacle/airspace clearance ensured, aircraft performance oriented.

Airspace Design Management

Airspace development environment

Airspace design Team interface



The different activities and the iterative nature of the task means that there must be very close co-operation between all the players involved in the process

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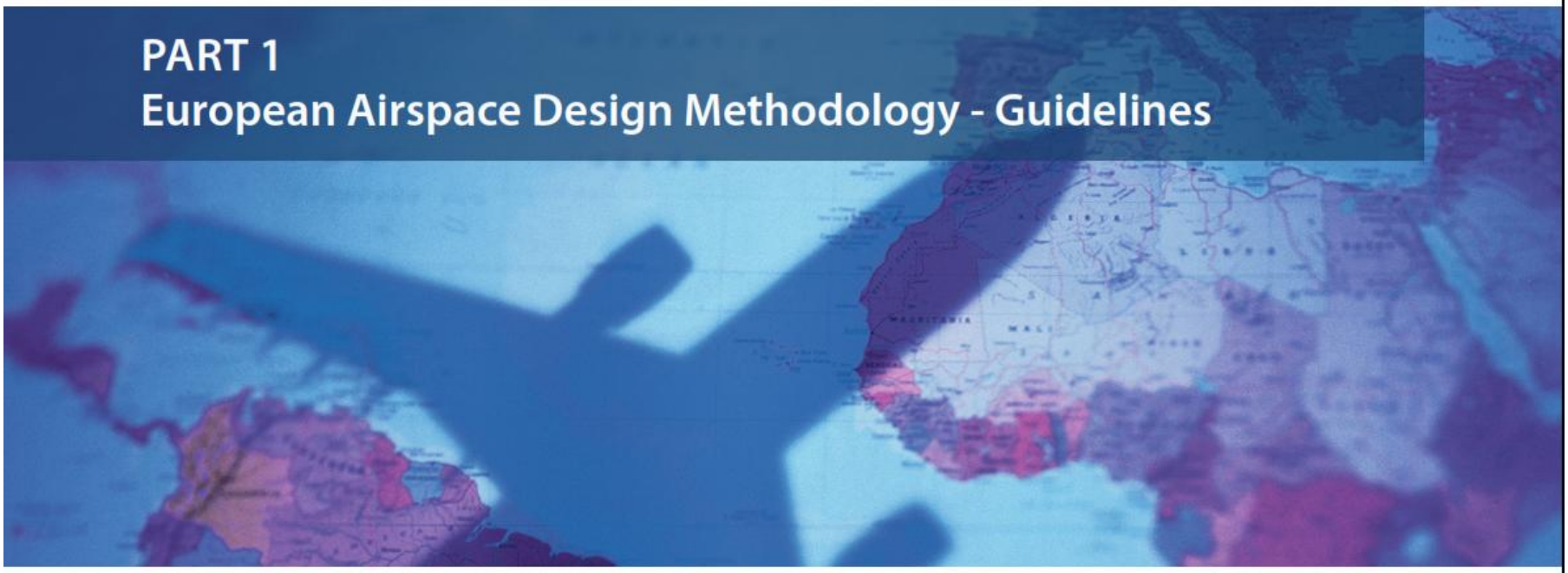
European Route Network Improvement Plan

Network Manager
nominated by
the European Commission



Airspace Design Principles – ABC

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	Principle	*Activity*	*Presentation in model form*
(a)	*the establishment and configuration of airspace structures shall be based on operational requirements, irrespective of national or functional airspace block borders or FIR boundaries, and shall not necessarily be bound by the division level between upper and lower airspace;*	*Airspace structures establishment*	*Airspace structures configuration*
(b)	*the design of airspace structures shall be a transparent process showing decisions made and their justification through taking into account the requirements of all users whilst reconciling safety, capacity, environmental aspects and with due regard to military and national security needs;*	*Transparent design process establishment*	*Airspace users volume allocation*
(c)	*the present and forecast traffic demand, at network and local level, and the performance targets shall be the input for the European Route Network improvement Plan with a view to satisfying the needs of the main traffic flows and airports;*	*European Route Network improvement*	*Route Network*

Airspace Design Principles – DEF

	Principle	*Activity*	*Presentation in model form*
(d)	*ensure vertical and horizontal connectivity, including terminal airspace and the airspace structure at the interface;*	*Vertical and horizontal connectivity*	*Terminal airspace and the airspace structure*
(e)	*the possibility for flights to operate along, or as near as possible to, user required routes and flight profiles in the en route phase of flight;*	*Realization the possibility to operate along, or as near as possible to, user required routes and flight profiles*	*Routes and flight profiles*
(f)	*the acceptance for assessment and possible development of all airspace structures proposals, including Free Route Airspace, multiple route options and CDRs, received from stakeholders having an operational requirement in that area;*	*Airspace structures development and assessment*	*All airspace structures*

Airspace Design Principles – GHIJ

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	Principle	Activity	Presentation in model form
(g)	the design of airspace structures including Free Route Airspace and ATC sectors shall take into account existing or proposed airspace structures designated for activities which require airspace reservation or restriction.	Design of airspace structures	ATC sectors Airspace reservation and restriction.
(h)	ATC sector design shall commence with the required route or traffic flow alignments within an iterative process that will ensure compatibility between routes or flows and sectors;	Required route or traffic flow alignments	Routes Flows
(i)	ATC sectors shall be designed to enable the construction of sector configurations that satisfy traffic flows and are adaptable and commensurate with variable traffic demand;	ATC sectors design	Sector configurations
(j)	agreements on service provision shall be established in cases where ATC sectors require, for operational reasons, to be designed across national or functional airspace block borders or FIR boundaries.	Agreements on service provision establishment	National or functional airspace block borders or FIR boundaries

European ATM Information Management Service (EAIMS)

- Accurate and timely information are organised and provided through system wide interoperability.
- Existing EAD enlarged with WX & Airport data, digital NOTAM, ADQ compliance.
- Pre-departure Static and Dynamic data including ATC planning, ASM and ATFCM.
- Integrated pan-European AIS service including meteo data.
- Extension to airports and airspace users.

Advanced Flexible Use of Airspace Support Service (AFUAS)

- Makes better use of available airspace.
- Allows military to use larger airspaces for missions on an absolute time-limited basis.
- Allows civil traffic to fly shorter routes.
- Provides ASM data visibility and ASM performance feedback.

LGS PBN components

1. Airspace Design Team
2. Iterate Development Environment of Airspace
3. Airspace Design Team Interface
4. Aeronautical Information Exchange Model
5. Geographical Information System
6. Airspace Performance Production and Live Exchange
7. **P**BN **A**irspace **N**ative **D**esign and **A**nalysis

Not all, but most interesting

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ATS Routes
and
Terminal Procedures

Ground
movement
procedures

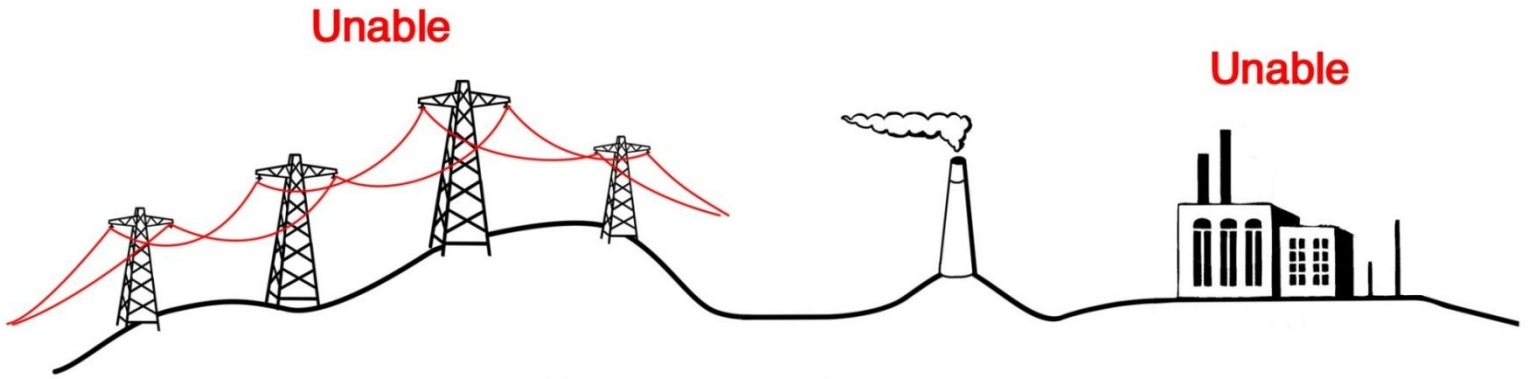
Terrain Obstacles

Texts
+
Tables
+
Charts

AIP

eAIP

Re-production
is needed



Dr. Tumarkin diagram 2013_05_14_01

Data origination and provision - LGS vision

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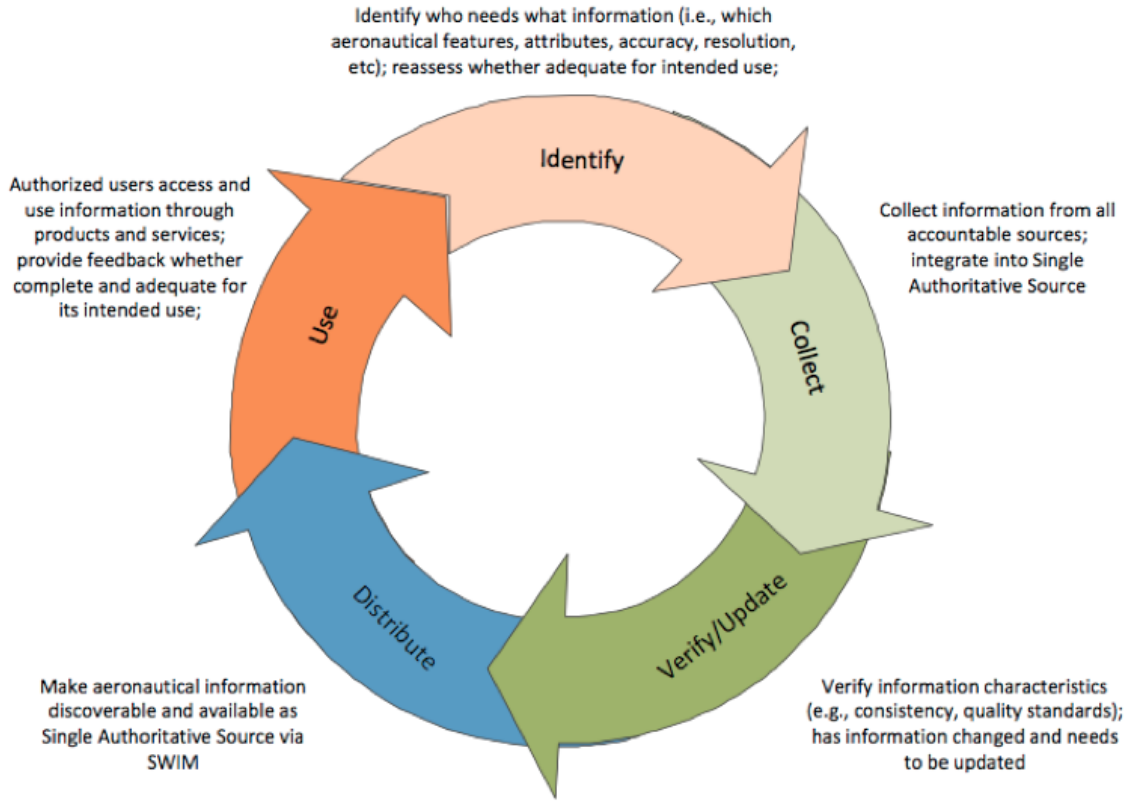
- Data collection and validation
- Airspace Design
- Flight Procedure Design
- AIXM messages generation
- Chart production
- Safety case and validation
- ATM infrastructure approval
- Information and Data provision



Future AIM business for ATM needs

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ATS Routes and Terminal Procedures
calculated

Ground movement procedures
derived

NAVAIDs | AD elements
surveyed
Terrain | Obstacles

Meta data – ISO 19115

AIXM 5.1 DB
ARINC 424

AMDB

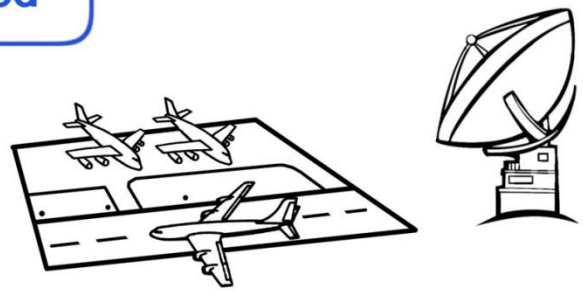
AMD

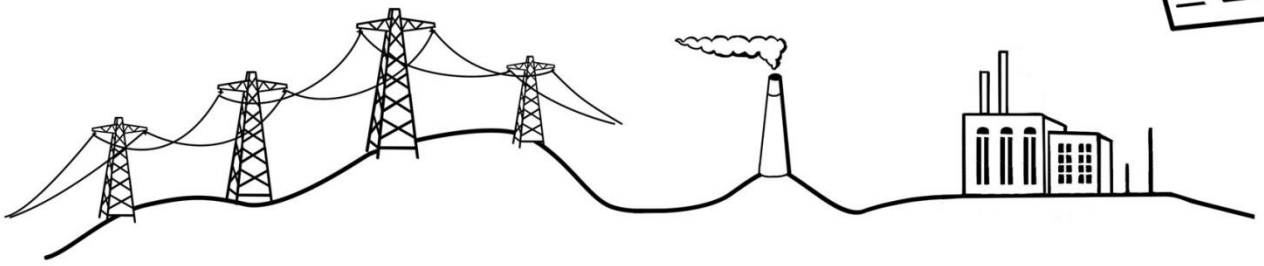
eTOD

AIM post-processed

ATM industry (end users)

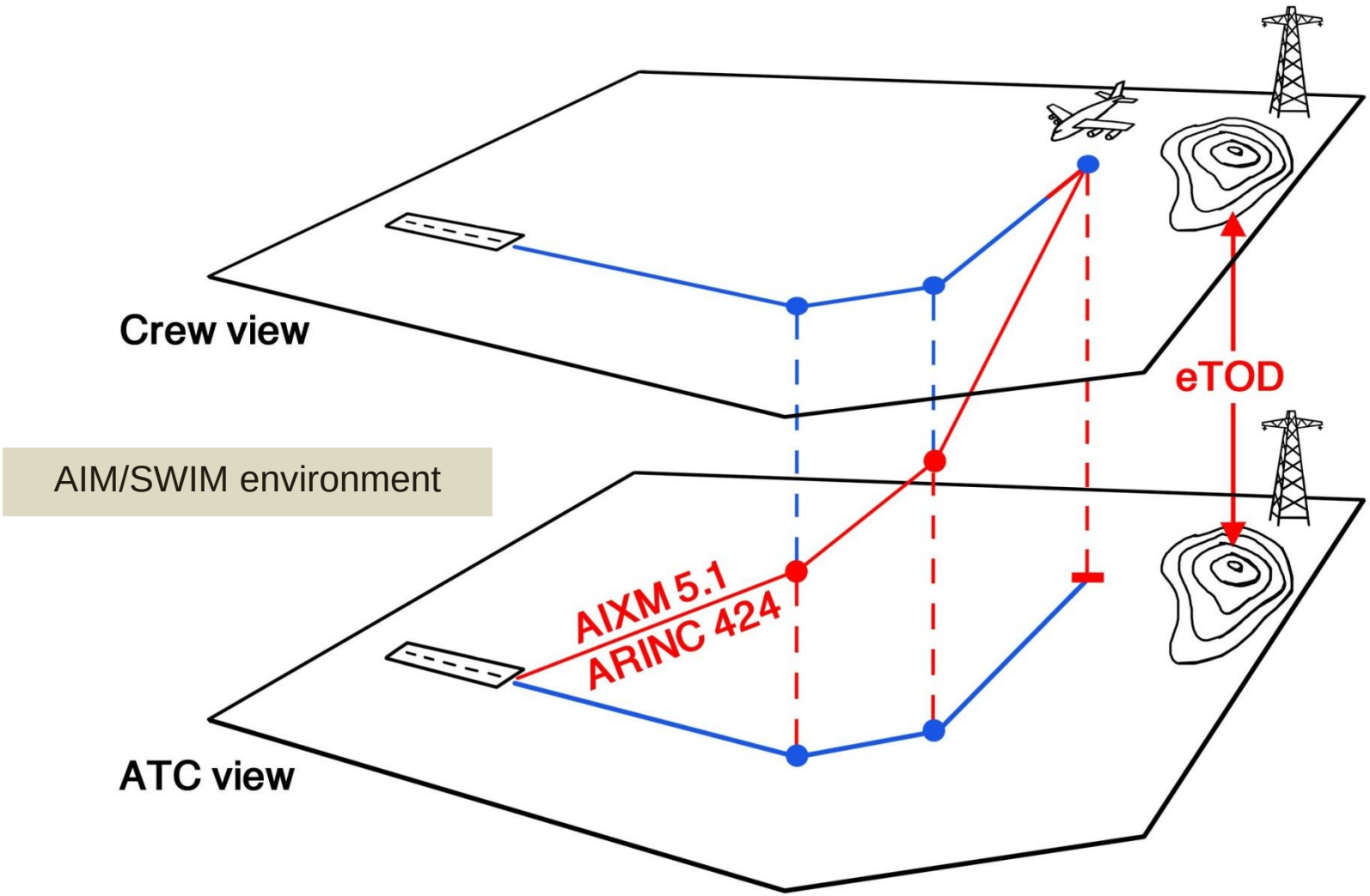
ATC, FMS, A-SMGCS, Simulators etc





Dr. Tumarkin diagram 2013_05_14_02

PBN Business Scenario



Dr. Tumarkin diagram 2013_05_14_03

Latvian AIM business for ATM needs

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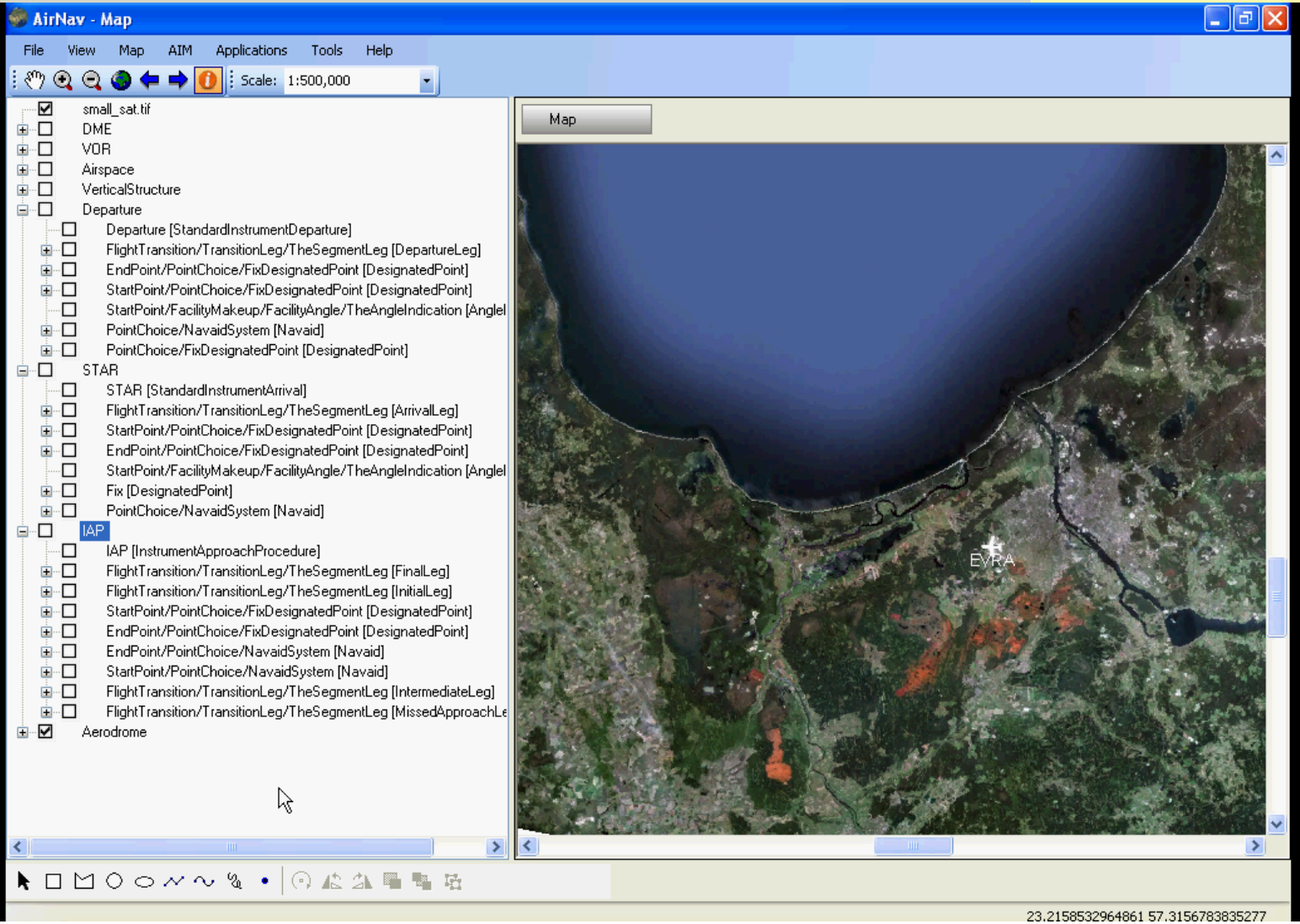

Airspace Production and Exchange

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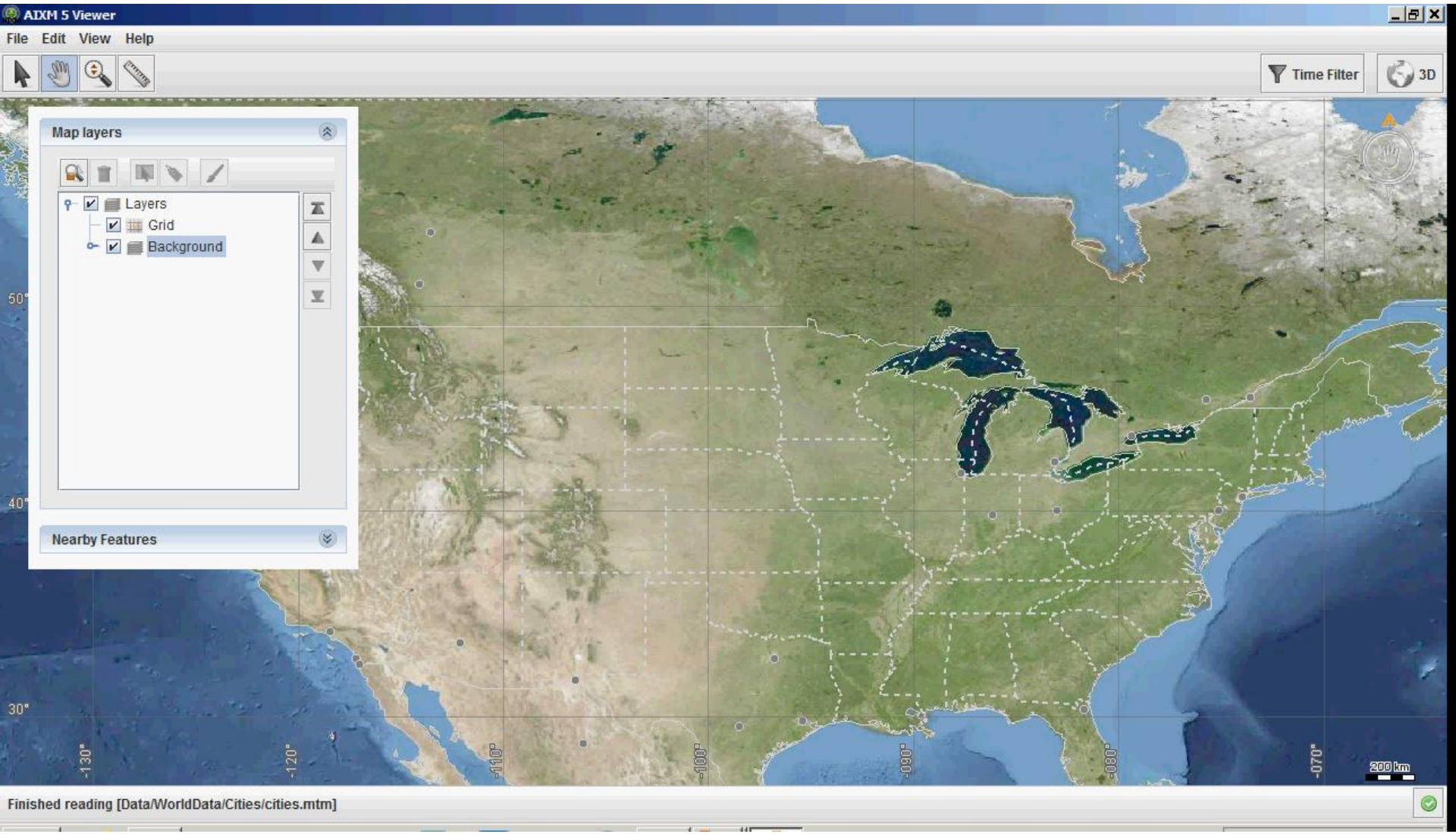

PBN Business Scenario

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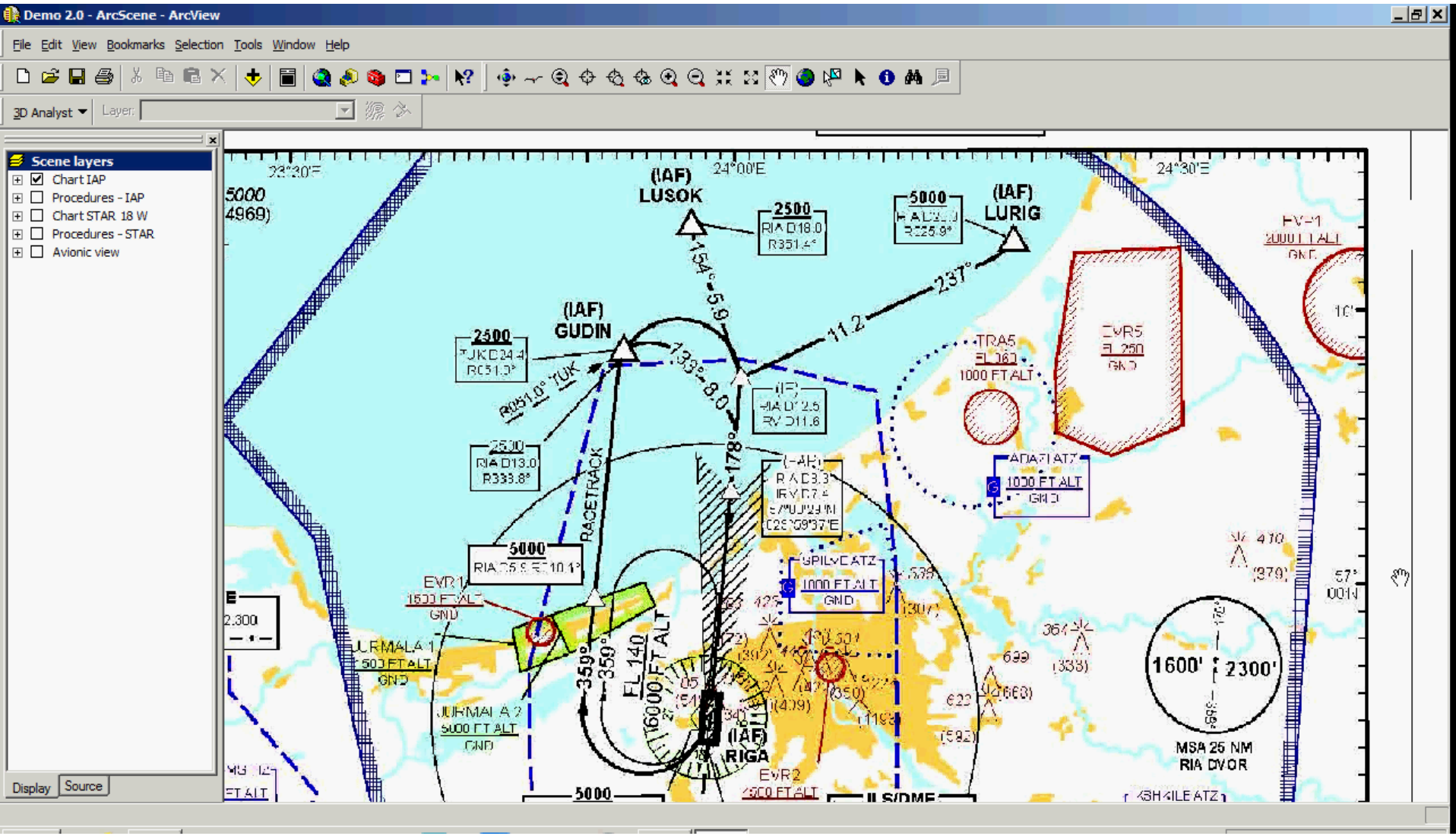

1. Regional Procedure ground validation mechanism may be established based on the following:
2. All preliminary design actions have to be done and appropriate input data and information must be prepared
3. Procedure Ground validation Process is embedded in GIS/AIXM 5.1 environment
4. Interested parties are invited to make flight procedures “translation” into Data set
5. Procedure “AIXM 5.1 presentation” makes it possible to
   - understand procedure design Concept
   - monitor criteria implemented and assess allocation of volumes associated with procedures
   - analyze data completeness needed for navigation DB and aeronautical charts
   - check procedure flyability (ARINC-424)
   - reduce validation cost
6. Provide Procedure Package in the model form.

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Iterate **D**evelopment **E**nvironment of **A**irspace

Live Demo

Many thanks for your attention

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Dr. Vadim Tumarkin
Head of AIS, Latvia

Questions, please