



ALTYs Technologies

DECEA Data Link Seminar – Recife, BR – 16 to 18 March 2016



- French aerospace engineering company
 - Founded in 2000, based in Toulouse, independent
 - Trusted partner of industries and public organizations
 - Consultancy, systems, integration, testing, certification, monitoring

- U



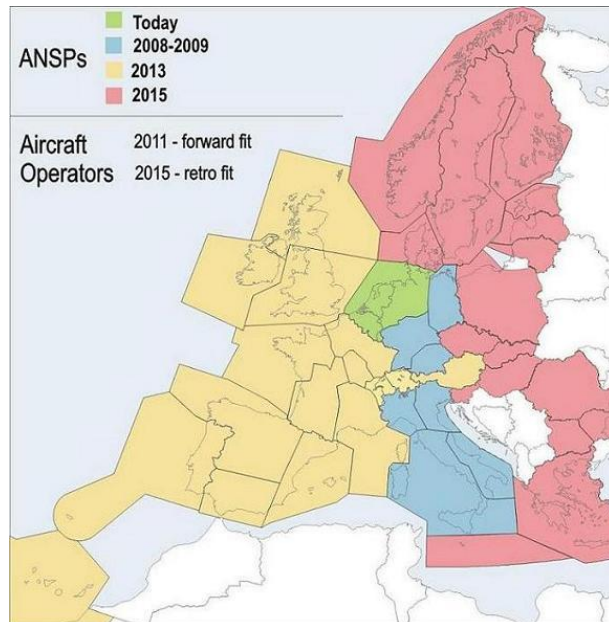
- Sound data link expertise, 85 years of combined engineering experience

- >Involved in data link standards definition since 90's
- >In charge of EUROCONTROL technology evaluation activities since 2004
- >Monitoring European infrastructure since 2006
- >Involved in FAA DataComm modeling and validation 2013, with Harris Corporation
- >In charge of SESAR JU's audit of the European civil aviation infrastructure along with NATS (leader), Airbus and others, cooperating in an industry-wide consortium
- >Interfacing and testing data link system implemented by major avionics vendors and ground system providers



- EU regulation 29/2009

- > Mandates the use of CPDLC in Europe's continental airspace over VDL Mode 2 / ATN infrastructure from 2015
- > Almost all aircraft flying in Europe upper airspace (above FL285)

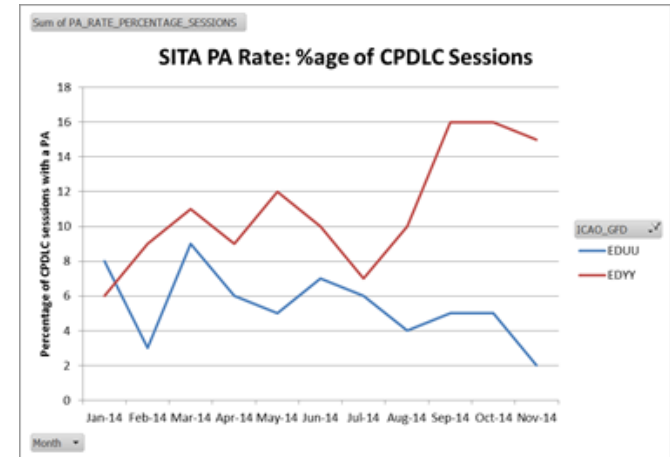


- EUROCONTROL Link2000+
 - > Active support to implementation of operational concept and technical infrastructure
 - > Objective: increase European ATM capacity and improve safety of operations



Large scale deployment issues

- Technical issues raise concerns about usability of the system & may jeopardize implementation of future ATM concepts such as 4D Trajectory
 - > CPDLC Provider Aborts (PAs)
 - > Long delays
- Known RF saturation phenomena on single VDL2 channel, avionic radio issues, other unknown issues severely impact performance



Monthly PA rate - 2014

- Large scale deployment issues investigation results challenging
 - > Intrinsically associated with RF phenomena (anticipation, analysis)
 - > System complexity, fragmented deployment, number of players and implementations

> Shared use of the system for airline operations





Mandated by the EC to investigate reasons for performance issues

>Report published in April 2014 identifies 10-point Action Plan

In charge of progressing the Action Plan through a phased approach

>Phase 1 – Further simulation, modeling and measurement

>Phase 2 – Flight trials and large scale demonstrations

>Phase 3 – Further 'deployment-focused' actions including governance



Europe's CPDLC mandate date postponed

>2018: Ground systems

>2020: Airborne equipment



- Phase 1a **DONE**
 - > SJU VDL2 capacity study (ENAV)
 - > Objective: refine Eurocontrol VDL Mode 2 capacity assessments to support ATC (and AOC) communications with additional frequencies & determine when a supplemental media is needed
- Main outcome

Additional VDL2 frequencies and optimizations are needed to extend viability of the system in European airspace until a supplemental media is proven mature enough for large scale deployment



- Phase 1b **IN PROGRESS (Due June 2016)**

- > SJU ELSA Project conducted by an industry-wide consortium led by NATS, with Airbus, ENAV and ALTYS as technical tasks leaders
- > Investigate root causes of problems and recommend resolution path

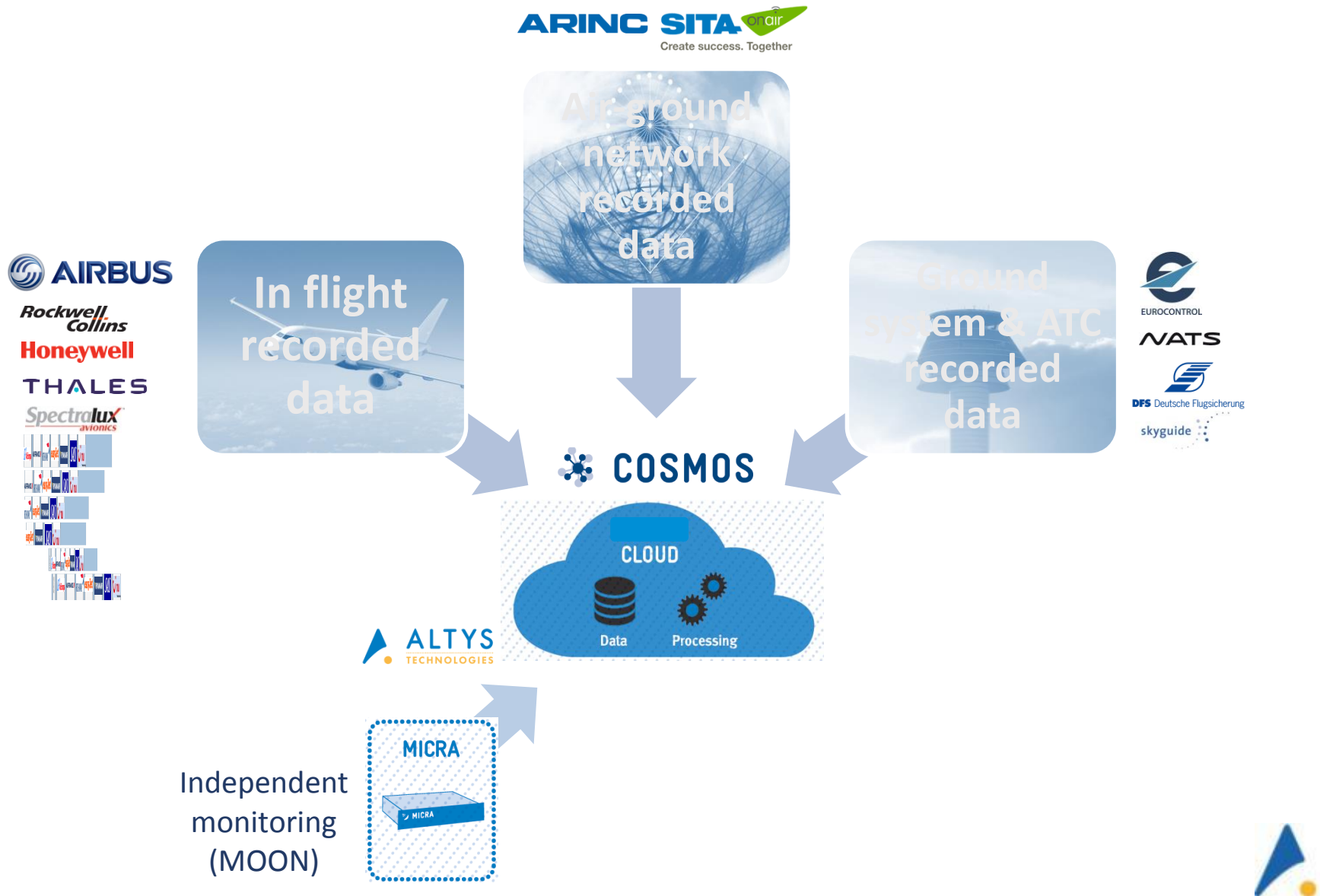


SESAR JU ELSA project – Work Area 1 (Airbus)

- Detect current issues, investigate root causes and characterize VDL2 channel occupation level
 - >Continuous performance monitoring
 - >Detailed investigation of issues
- Collection of ground and airborne data using revenue flights and dedicated flight tests to build the complete picture



SESAR JU ELSA project – Work Area 1 (Airbus)

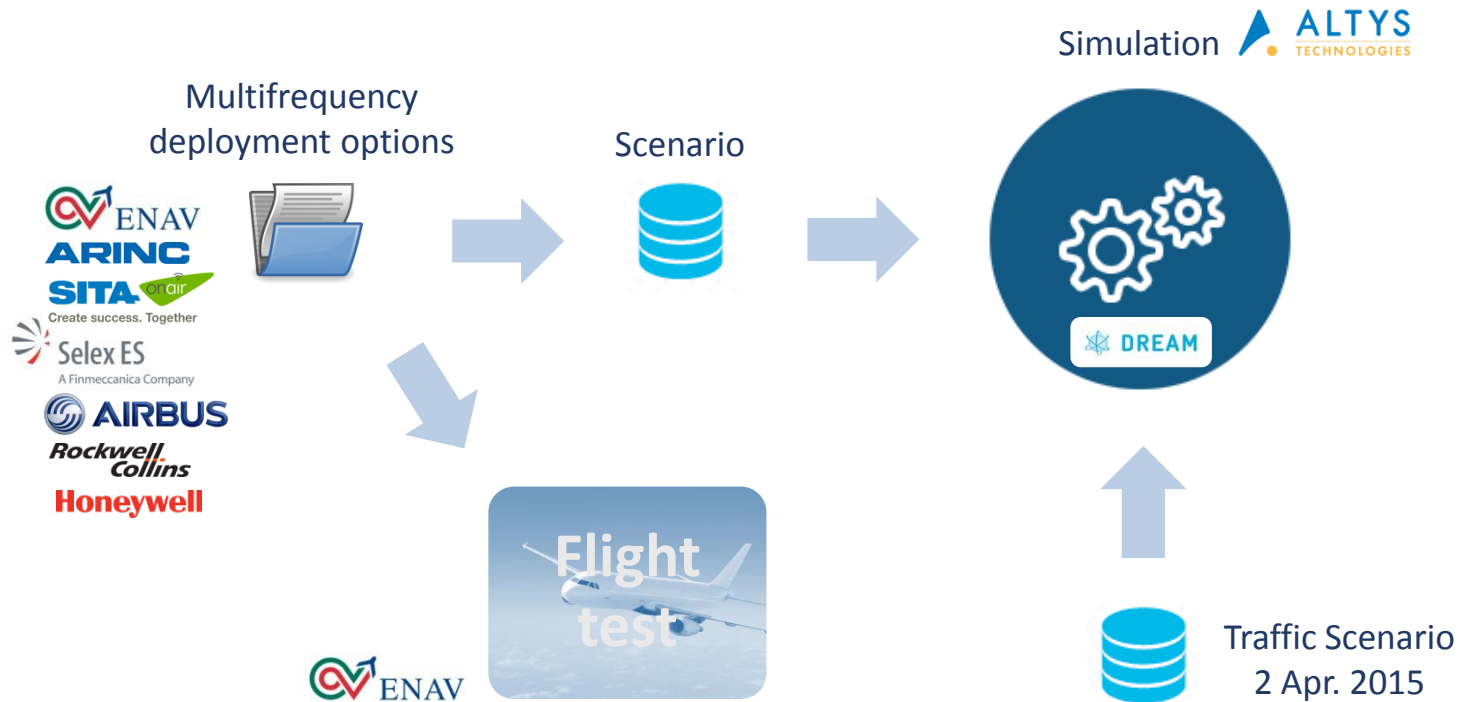


SESAR JU ELSA project – Work Area 2 (ENAV)

- Definition and evaluation of VDL2 multi-frequency deployment options through modeling
- Channel use, frequency assignment, network topology and network management



SESAR JU ELSA project – Work Area 2 (ENAV)



- Large scale system/RF modeling supporting assessment activities...
 - > Evaluation of nominal European infrastructure behavior through realistic modeling
 - > Assessment of protocol optimizations improving overall system performance
- ...and avionics testing
 - > Extensive testing of a representative set of avionics from Airbus, Rockwell Collins and Honeywell
 - > Tested functions: VDR and CMU, including VDL2 multi-frequency



SESAR JU ELSA project – Work Area 3 (ALTYs)

● Scenario Definition & Results Baseline

Scenario definition

Apr & Dec 2015 – Core Europe



Aircraft Traffic
Network topology
ATC / AOC applications

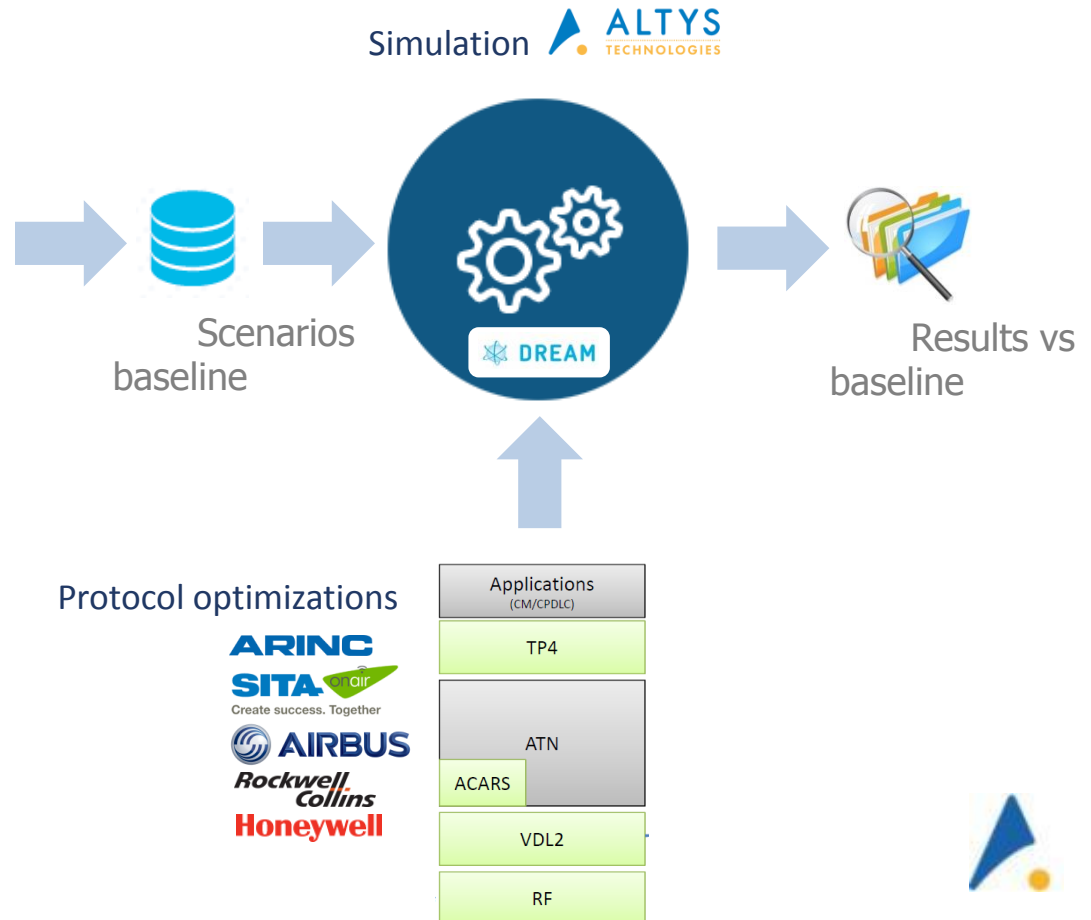


SESAR JU ELSA project – Work Area 3 (ALTYs)

- Protocol optimizations assessment

Targeted Scenario

2 Apr. 2015 – Core Europe



SESAR JU ELSA project – Work Area 3 (ALTYS)

- Extensive avionic functions testing
 - VHF Data Radio
 - CMU



Testing 

2 x 2 weeks



SESAR JU ELSA project – Initial outcome

- General
 - >All partners heavily involved in the process
 - >Real progress made since end 2014
- 136.975 MHz frequency saturation confirmed
 - Major airports: London, Paris, Frankfurt
 - Initial deployment of second terminal frequency at key sites demonstrates benefits
 - Preparation of VDL2-MF deployment full scale
 -
- Investigation of other findings on ground network and avionics performance
- SESAR JU in charge of disseminating results



Conditions for successful large scale ATC data link deployment

- >Centralized program
- >Public governance in partnership with industry
- >Endorsement of end-users
- >Controlled engineering process



Our lessons learnt



- Large scale data link deployment and operation is challenging...

...but solutions do exist!

- > **Large scale modeling** in support of system engineering and deployment planning
- > **Extensive qualification testing** of ground systems and avionics
- > Efficient **frequency resource management** when in operation
- > **Continuous monitoring** of performance and tracking of issues



Risk mitigation – Design and planning

- Early evaluation of user constraints and technical requirements through realistic simulation techniques is a MUST
 - >Capacity & performance requirements
 - >Deployment survey
 - >Frequency management & deployment planning
 - >System optimization
- With an unrivalled level of realism and sophistication, DREAM models large portions of airspaces involving thousands of moving aircraft and widely deployed networks
 - >RF propagation model simulating all physical phenomena
 - >Aircraft and ground systems implement fully standard compliant protocols and applications

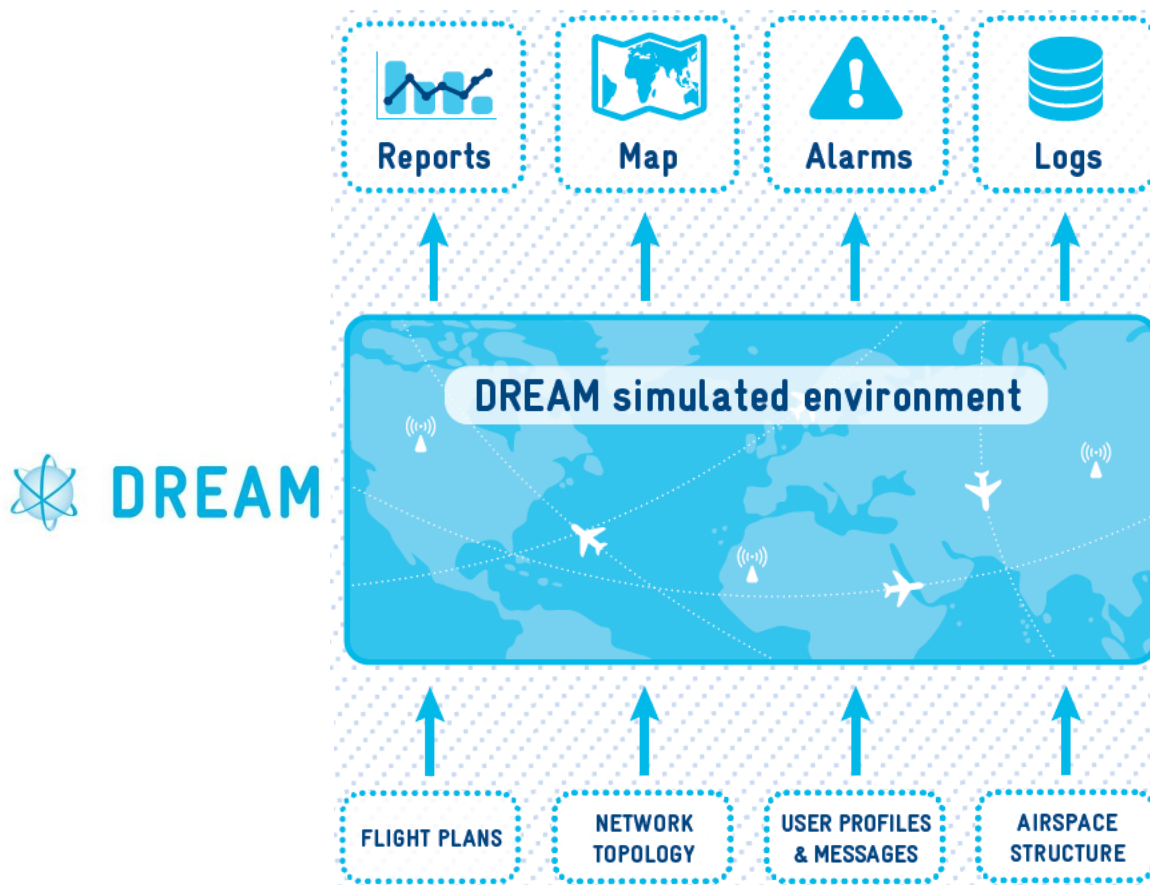


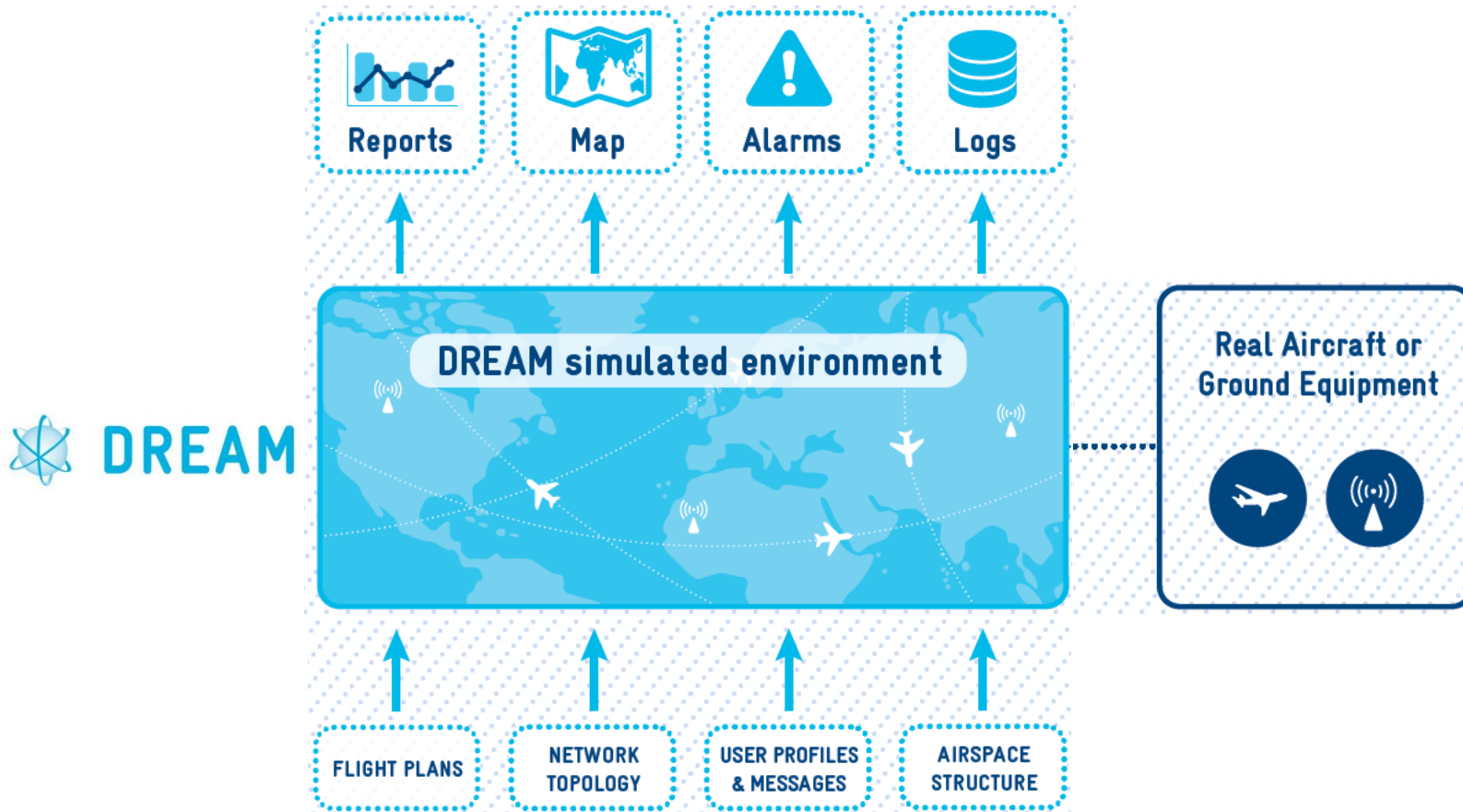
Risk mitigation - Qualification testing

- Extensive qualification / certification testing of ground networks and avionic systems vs interoperability, performance and capacity requirements
- Immerse data link equipments and systems into that wholly virtualized operational environment:
 - >Connecting through the VHF or a network interface
 - >Enterprise-wide testing, endurance testing



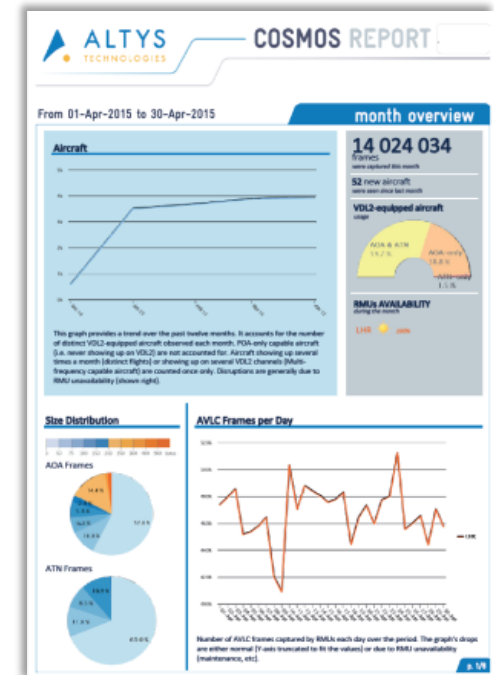
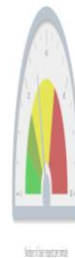
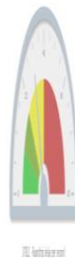
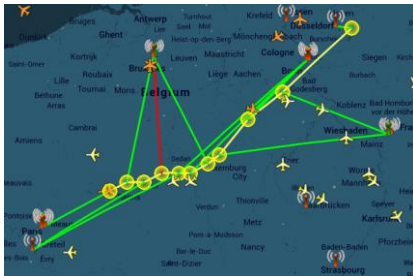
DREAM – Large scale modeling platform





Risk mitigation - Operational monitoring

- Continuous monitoring of the data link infrastructure is a MUST
 - >Performance / Service Level Agreement Monitoring
 - >Issues detection & analysis
 - >Frequency use management
 - >COM issues anticipation and ATC alerting system

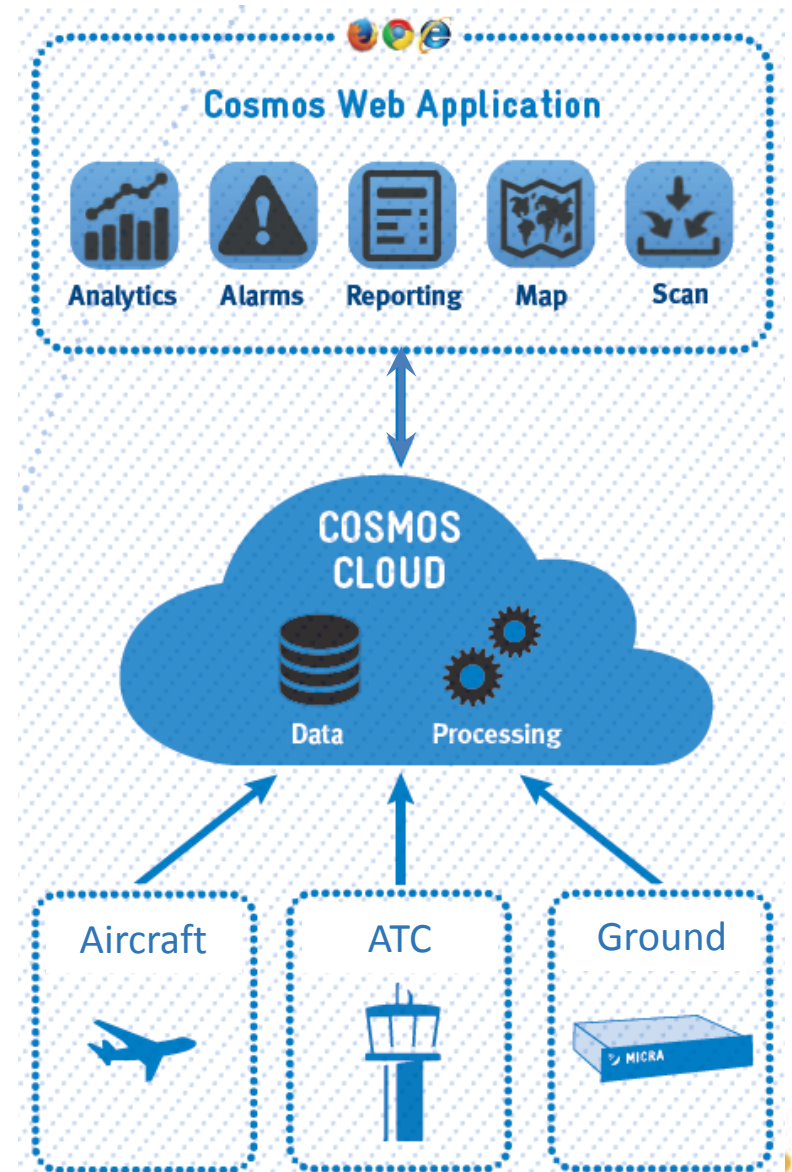


COSMOS - Operational monitoring

- Multi-source – live data flows or
- Cloud based infrastructure
- Web based services

The COSMOS platform offers a wide range of functions, powerful analytics, easy-to-use monitoring and decision-making support tools:

- CUSTOMIZABLE KPIS AND VISUALIZATION HMI
- CONFIGURABLE EVENT DETECTION
- E-MAIL / SMS ALERT
- GENERIC STATISTICS QUERY ENGINE
- AUTOMATICALLY GENERATED REPORTS
- DATA NAVIGATION & ANALYSIS
- GEO-LOCALIZED EVENT TRACKING
- MANUAL DATA IMPORT



- Jérôme FERRER - ATM Business Unit Manager
> jerome.ferrer@altys-tech.net
- Carlos GONZALEZ - Director of Business Development, Americas
> +33 988 777 404
> carlos.gonzalez@altys-tech.net
> +1 786 942-1600





ASSOCIATE PARTNER



**BUREAU
VERITAS**

EN 9100

info@altys-tech.net
www.altys-tech.net

7, Avenue Parmentier
31200 Toulouse
France
6800 SW 40th St
Miami, FL, 33155
USA

