



All Wx Ops using SBAS

23 May 2016 | 11:50 – 12:25

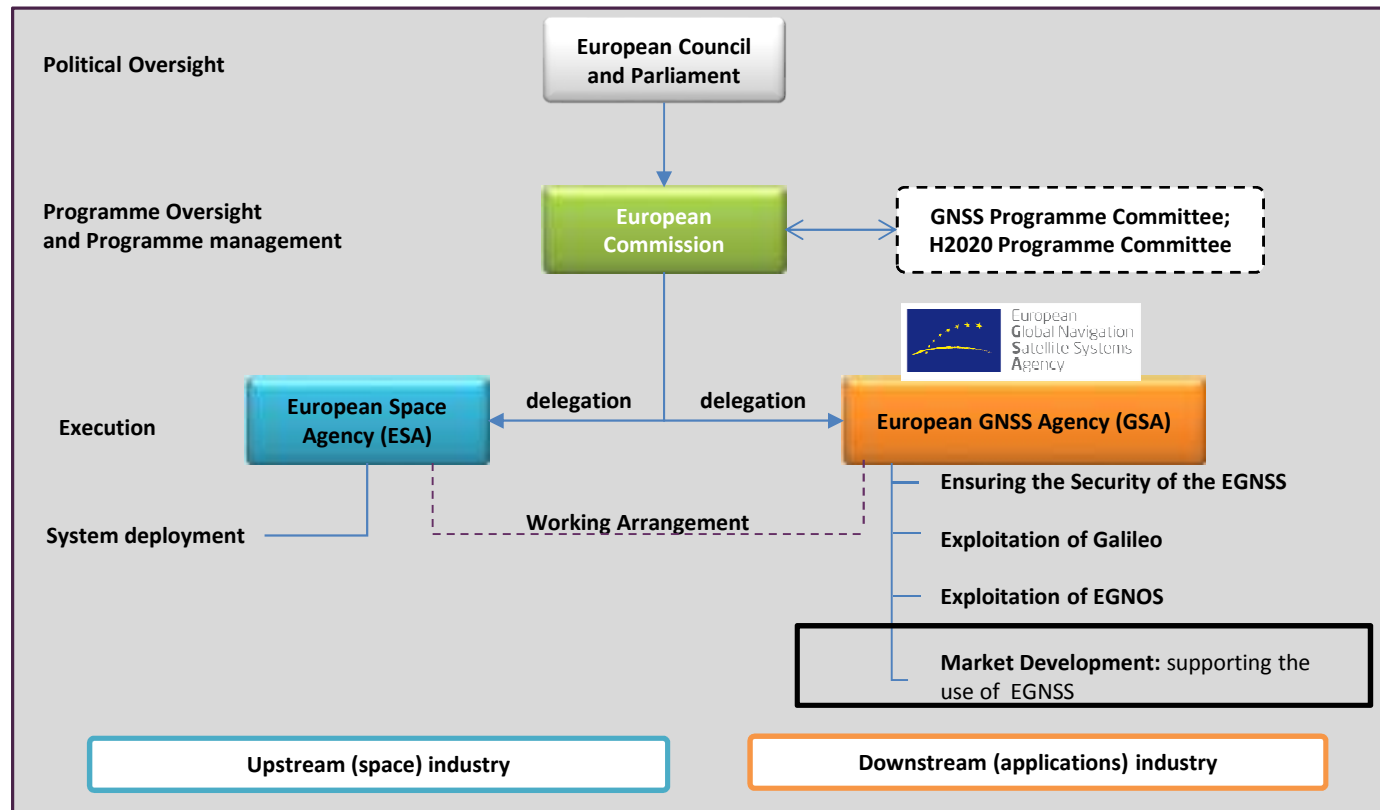
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GSA role within the EU GNSS programmes



The European GNSS programmes

GALILEO

- Global Navigation Satellite Systems (GNSS)
- Autonomous infrastructure
- 4 services (under development)
- Worldwide coverage
- **12 Satellites in orbit, 2 more being launched tomorrow!**



EGNOS


- Satellite Based Augmentation System (SBAS)
- Improves GPS performance, crucial for safety critical applications:
 - Increases Accuracy
 - Provides Integrity: measure of the trust on the navigation information
- 3 services. Certified for Civil Aviation use in 2011
- Continental coverage
- EGNOS SoL Compliant with ICAO APV-I requirements.
- New LPV200 service level



| | | | |
|----------|------------|-----------|--------------|
| Accuracy | Continuity | Integrity | Availability |
|----------|------------|-----------|--------------|



EGNOS services for civil aviation

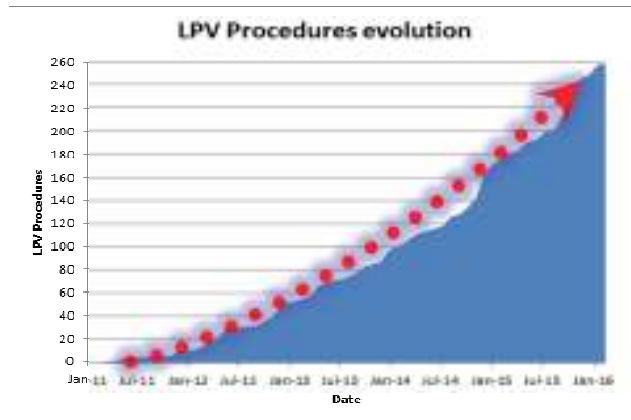
- European SBAS enabling the implementation of RNP APCH down to LPV minima
 - ESSP has been certified based on the Single European Sky Regulatory
 - APV-I service available since 2nd March 2011
 - Allowing for LPV approach procedures with DH ≥ 250 ft
 - LPV-200 available since 29th September 2015
 - Allowing for LPV approach procedures with DH ≥ 200 ft (i.e. CAT-I)
- 
- EGNOS landing procedures being developed around EU for their benefits:
 - Precise vertical guidance
 - Safer landings at airports not equipped with ground-based navigation aids (e.g. ILS)
 - Increased airports capacity



LPV status today and plans

SIGNIFICANT HIGHLIGHTS:

- ❑ Numerous LPV publications expected
> 440 LPV by 2018
- ❑ Growing interest
- ❑ Significant increase of new plans



As of 23rd May 2016

255 LPV procedures
89 'EGNOS enabled' APV Baro






Plans by 2018

> 440 LPV procedures



Most common SBAS ready aircraft/rotorcraft in Commercial, Business and General Aviation...

| | | | | | | |
|-------------------------|--|--|---|--|---|--|
| COMMERCIAL/ REGIONAL |   ATR42-600, 72-600 |   Airbus A350, Beluga |   Bombardier CRJ 700/900/1000, CS100/300, Dash 8 Q400 |   AW109SP, AW119Kx, AW139, AW169, AW189 |   Bell 429, 505, 650 |   H135, H145, H175, H225, EC135, EC145 |
| |   Challenger 300/350, Learjet 70/75/60XR |   Citation Mustang, M2, CJ2+, CJ3+, CJ4, XLS+, Latitude, Sovereign+, X+ and Longitude |   SB Falcon 900LX/5X/ 7X/2000LXS/2000S, |   G650 and G280, SB G150/G550/G450/G3 50 |   King Air, Baron, Bonanza , Hawker 400XPR/800XPR | |
| |   Citation, Caravan and Single Engine |   Pilatus PC6, PC24 and PC12/47E (SB) |   DA20, 40XLT, 40CS, D-Jet, 42 and 50 |   SR20, SR22, SR22T , and Vision SF50 |   Meridian, Seminole, Mirage, Matrix, Archer, Seneca V and Arrow | |

... and other have retrofit solutions available



Bombardier CL60



Bombardier GL5T



Bombardier 850



BAE H25B (800 series)



GulfStream GV-SP



Dassault 900LX



Dassault 7X



Dassault 2000LXS



Dassault 2000S



Pilatus PC-12



Piaggio Avanti I



Avanti II & evo



Beech kingAir200



Beech 1900



Beech 300



Bell 412



EC 135



Cessna Citation II



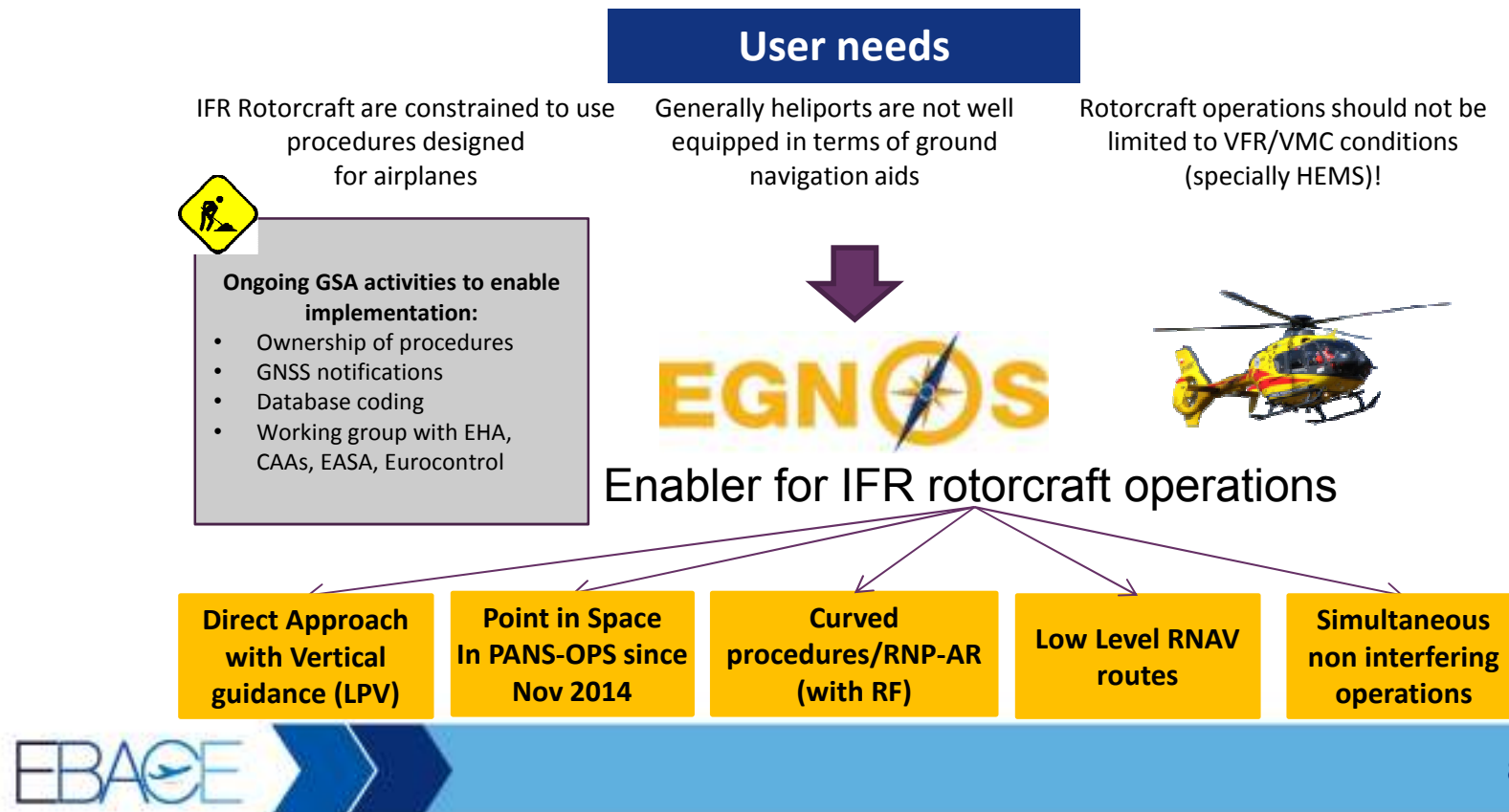
Cessna 525



Cessna 500

GSA support focus on solutions to fleet flying to LPV priority destinations

EGNOS is an enabler for IFR rotorcraft operations and regulatory framework is under development



Bringing LV to less equipped airfields

The challenge:
LPV to non-instrument runway
(ATS? Runway? MET/COM?)



"GA need help to increase GNSS approaches implementation and increase safety"



Paul Sherry, PPL/IR Europe.

Regulatory framework
The UK CAP 1122

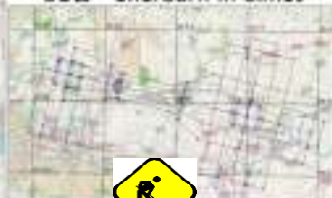


Pilot cases in UK and Spain

EGPT - Perth



EGCJ - Sherburn-in-Elmet



Ongoing GSA activities to enable implementation:

- Analysis of the regulatory framework
- Review with EASA and Eurocontrol
- Pilot cases in UK Switzerland and Spain

EBAGE



First LPV 200 in Europe: Paris CDG



MINM AD : distances verticales en pieds, RVR et VIS en mètres / vertical distances in feet, RVR and VIS in metres.

| CAT | LPV | | OCH LPV | LNAV-VNAV | | OCH LNAV VNAV | LNAV | | OCH LNAV | MVL / Circling (2) OBL → OBR | |
|-----|-----------|-----|---------|-----------|-----|---------------|-----------|------|----------|------------------------------|------|
| | DA (H) | RVR | | DA (H) | RVR | | MDA (H) | RVR | | MDA (H) | VIS |
| A | 540 (200) | | 159 | 670 (340) | 800 | 331 | 780 (440) | 1300 | 434 | 940 (600) | 3000 |
| B | 540 (200) | | 171 | 680 (340) | 800 | 333 | 790 (450) | 1400 | 447 | 940 (600) | 3000 |
| C | 540 (200) | 550 | 189 | 680 (340) | 800 | 336 | 790 (450) | 1400 | 447 | 1040 (700) | 3500 |
| D | 540 (200) | | 200 | 690 (350) | 900 | 344 | 790 (450) | 1400 | 447 | 1090 (750) | 4000 |
| DL | 550 (210) | | 203 | | | | | | | | |

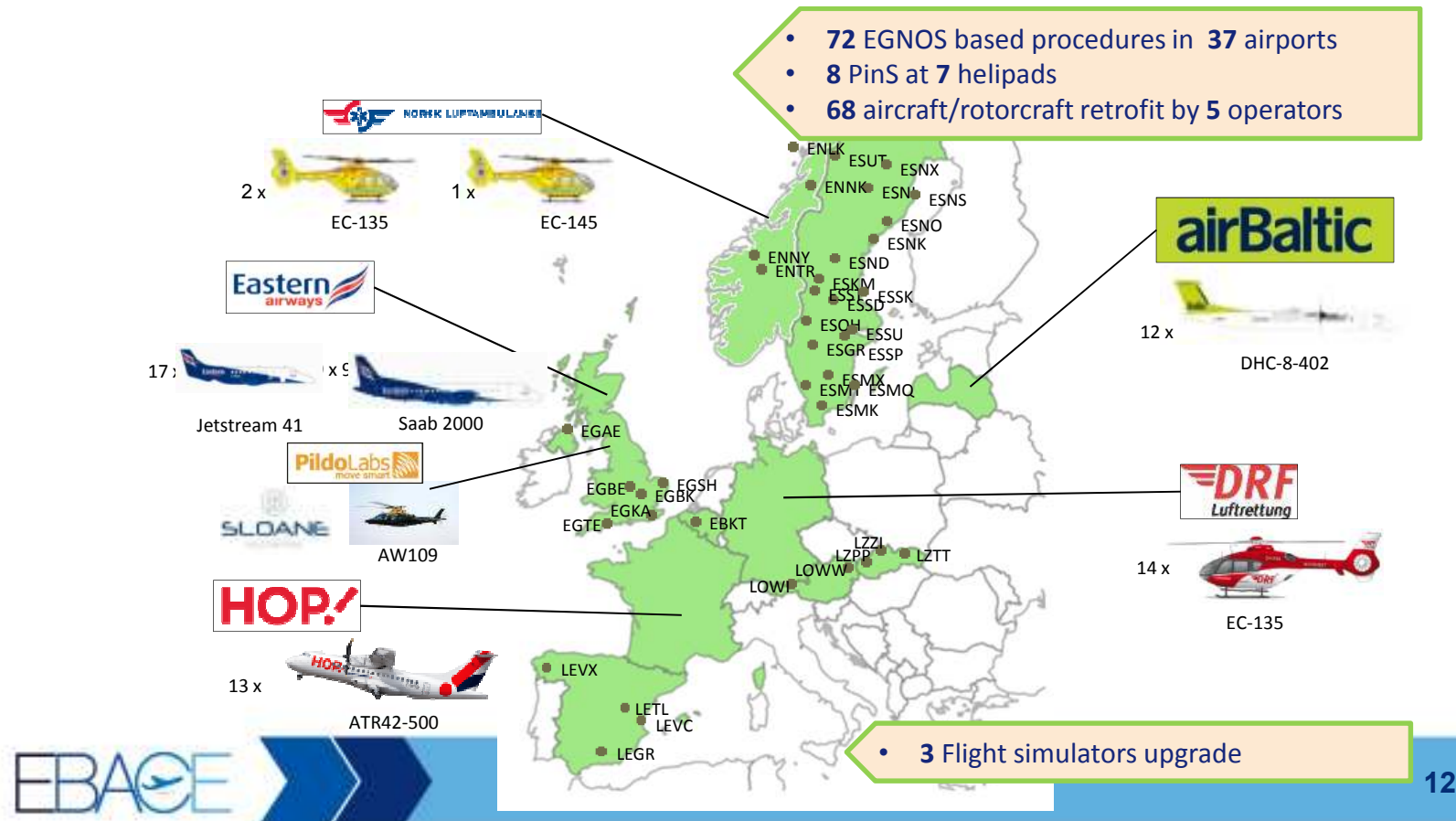
- [First LPV 200 procedures](#) published at LFPV on 28th April 2016
- Four runway ends covered
- Clear decision height advantage compared to LNAV/VNAV

LPV 200 in Paris Charles de Gaulle

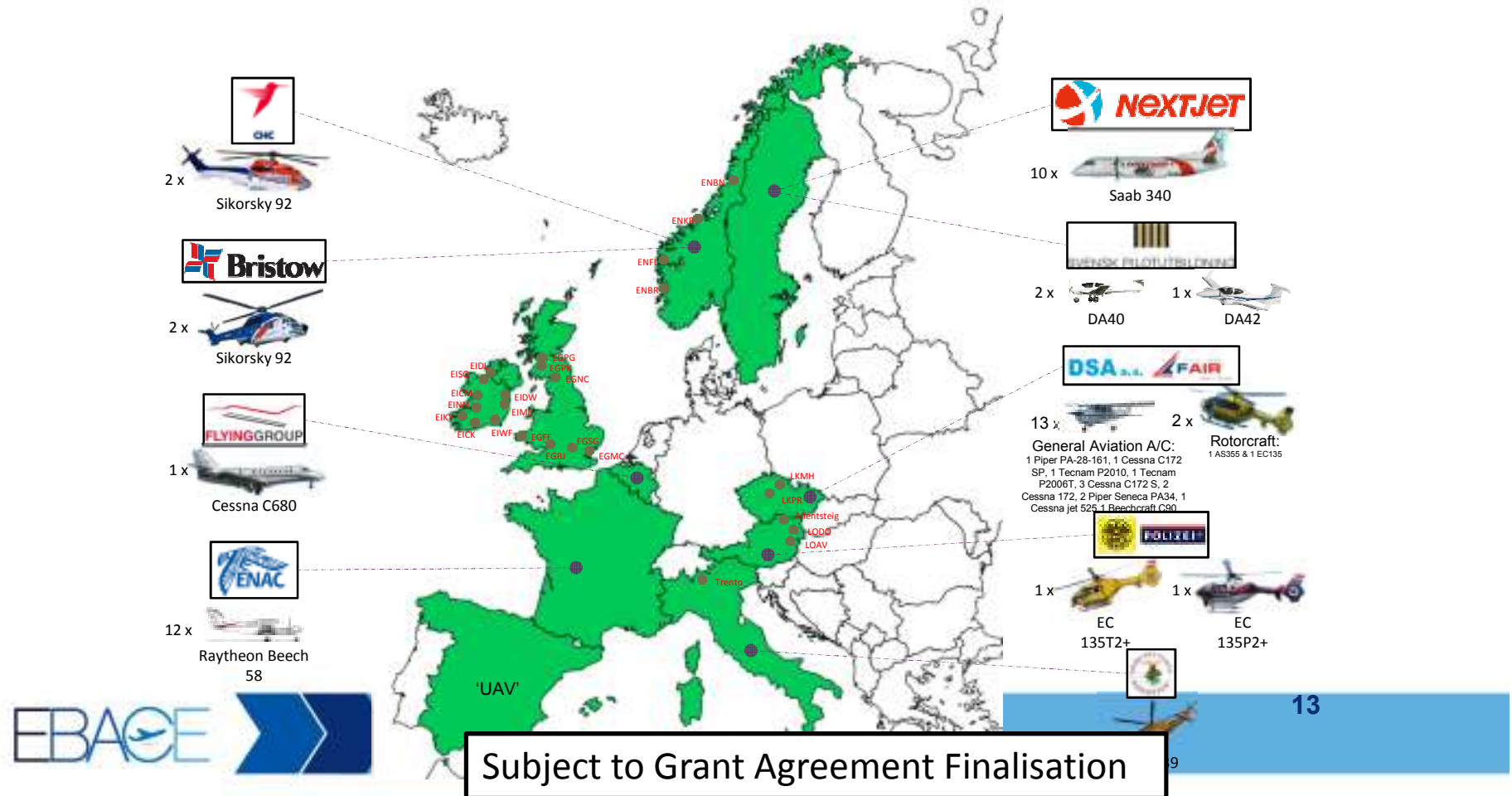
- First time these procedures were flown by 3 different test aircraft on 3 May 2016
 - Dassault Falcon2000 XLS: 4 test approaches
 - ATR42-600 : 6 test approaches
 - Airbus A350XWB: 2 test approaches
- All test flights were successful, and very good feedback from pilots:
 - *'The accuracy and stability of the LPV guidance is really amazing'* → Jean-Louis Dumas, Dassault test pilot
 - *'The LPV200 is much more stable and reliable in terms of safety, but also more efficient than the ILS approach'* → Eric Delesalle, ATR chief pilot
 - *'Airbus is pleased to have demonstrated that the A350 XWB complies with the new RNAV approach with SBAS. These approaches will be a valuable back up for traditional ILS'* → Jean-Christophe Lair, Airbus Experimental test pilot



GSA call for grants 2014: 13 projects funded, 6M€



GSA call for grants 2015: 15 projects to be funded, 6M€



Join us in the EBAA-GSA LPV Working Group meeting at EBACE!



Part I : 9h30 – 10h30



- LPV 200
- EBAA Priority airports for LPV
- How to obtain Operational Approval
- Upcoming regulations on LPV and related training
- EU funding opportunities

Part II : 10h30 – 12h30



- General overview
- EBAA consortium bid
- Next steps

Wednesday 25th May 2016

EBACE , Palexpo, Congress Centre, Room E



EBACE

24-26 MAY 2016 | GENEVA

