



PJ14 EECNS COM Open Day

PJ14-02-05 – FIS/TIS data for General Aviation

23 October 2019

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Founding Members



EUROPEAN UNION



EUROCONTROL

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Introduction and context (1)

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- **Solution title:**

Development of new services similar to FIS-B to support ADS-B solutions for General Aviation

- **Solution description:**

This solution is aiming for increasing safety for GA pilots by providing additional and updated information during flight execution on a LTE-based data link with new, re-directed antennas. The information will be displayed on mobile devices (e.g. tablets) in order to avoid expensive retro-fitting actions on GA aircraft. The provision of this additional information will not change pilots' duties or flight rules, but will provide pilots with real-time traffic data as well as updated NOTAM, weather and FUA data.

Introduction and context (2)

PJ14-02-05



- **SESAR 1:**
 - No predecessor of this SESAR2020 Solution in SESAR 1
- **SESAR2020, Wave 1:**
 - V1 Phase: Feb. 2017 – Nov. 2018
 - V2 Phase: Aug. 2018 – Oct. 2019
- **Solution partners:**

SESAR members

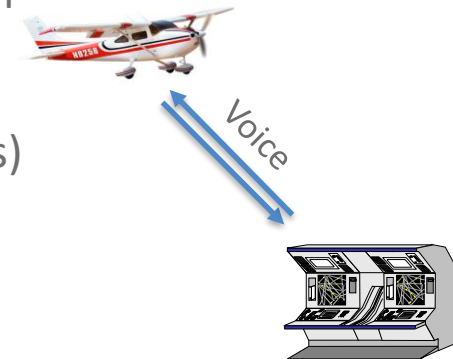


Associated members



PJ14-02-05 Objectives (1)

- **Today's situation:**
 - UAT not available in Europe
 - Mode S / ADS-B transponders often not available in GA aircraft or too expensive for General Aviation (GA) aircraft owners to retrofit
 - FIS information (weather, NOTAM, FUA) from flight preparation is sometimes superseded during flight
 - Some new info during flight only via voice COM (FIS controllers)
 - GA pilots only to “see and avoid” (traffic, weather)
 - no graphical traffic or weather pictures available on-board



- **Overall solution objective:**

**Increase of safety for General Aviation pilots
by providing additional and updated FIS/TIS information during flight**

PJ14-02-05 Objectives (2)

Proposal of a new FIS/TIS in-flight information service for GA:

- Provision of actual FIS/TIS information during flight
- Additional information service without changing procedures or responsibilities
- Low-cost solution for GA pilots and GA aircraft owners (airframe/avionics untouched; no change of ATM system)



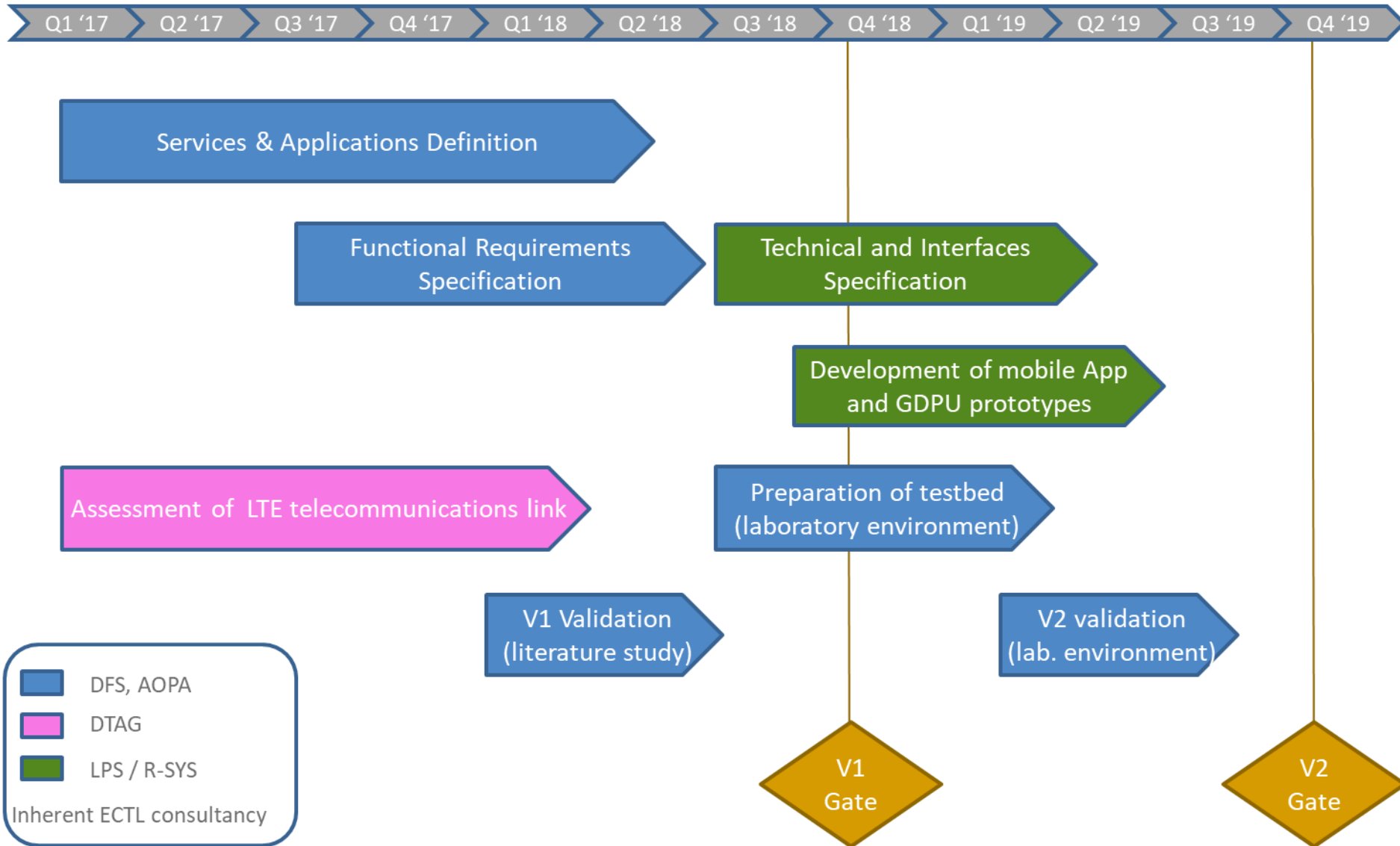
Systems:

- **A/G data link** based on LTE (mobile cellular network) with up-tilted antennas for GA altitudes (1,000 ft. to 10,000 ft. MSL)
- **Standard mobile device** (e. g. tablet) on-board of the aircraft with a new **App** installed, and where the integrated information is displayed
- **Ground Data Processing Unit (GDPU)** integrating relevant FIS/TIS data to be transferred to the App (point-to-point connections)



PJ14-02-05 Methodology (1)

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PJ14-02-05 Methodology (2)

Operating Environment:

- Altitudes where GA aircraft are flying, i.e. from 1,000 ft. AGL to 10,000 ft. MSL (or to 13,000 ft. MSL at mountain areas)
- Lateral surface: European landscape plus European seawaters

New challenge for telecom providers:

✓ European Aviation Network (EAN)

❖ Not covered so far

✓ Terrestrial services

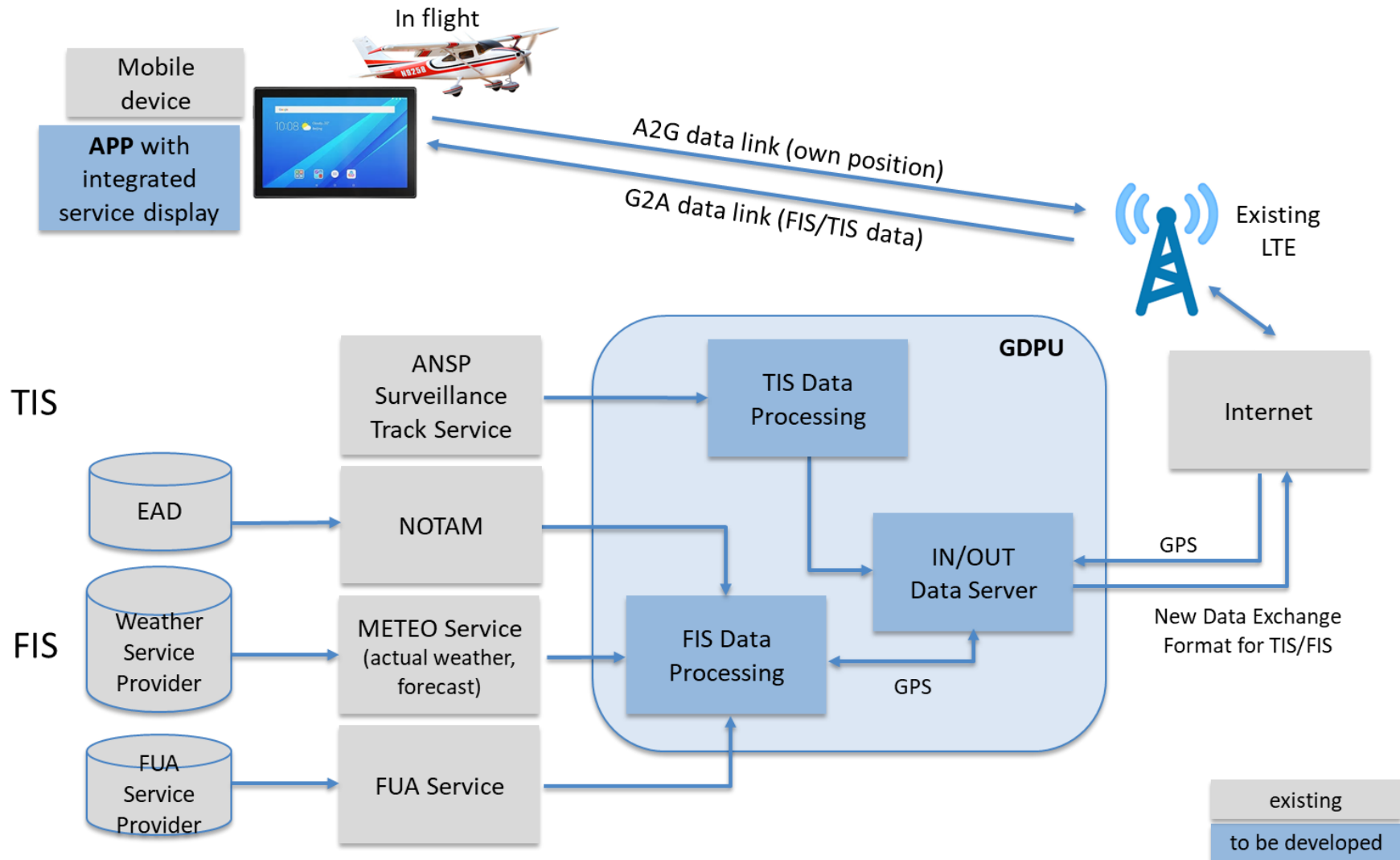


PJ14-02-05 Methodology (3)

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System architecture / testbed:

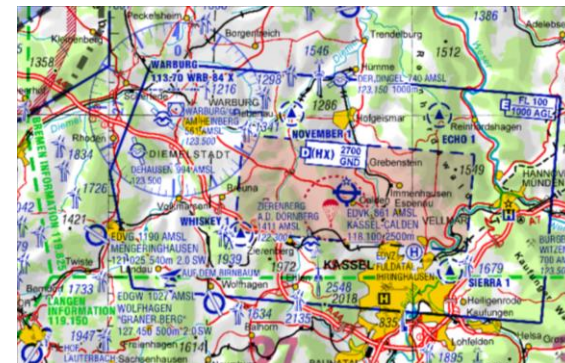
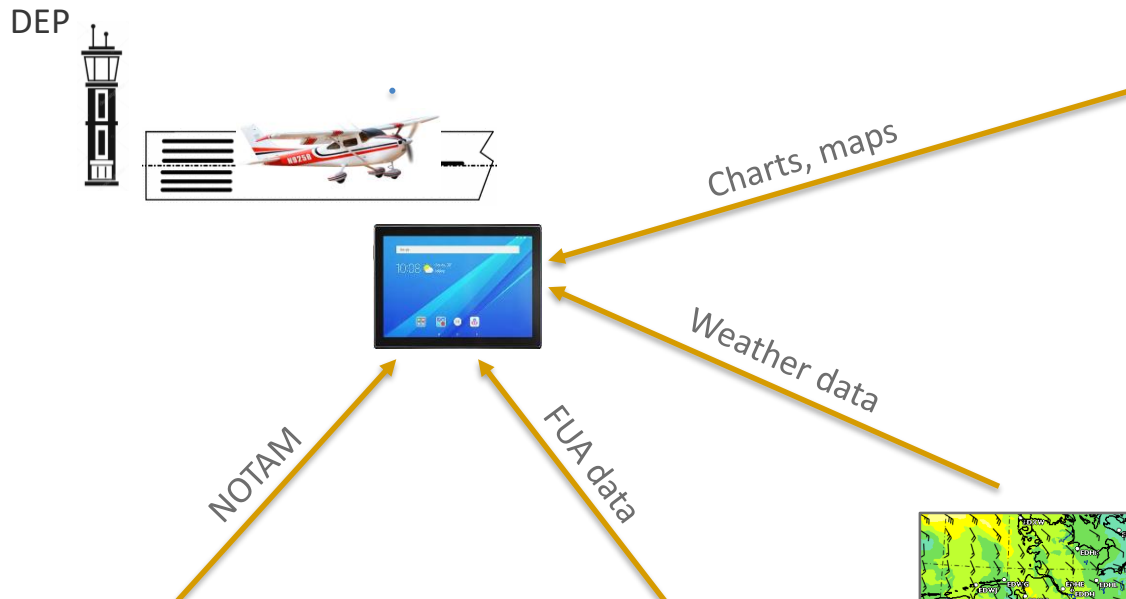


PJ14-02-05 Methodology (4)

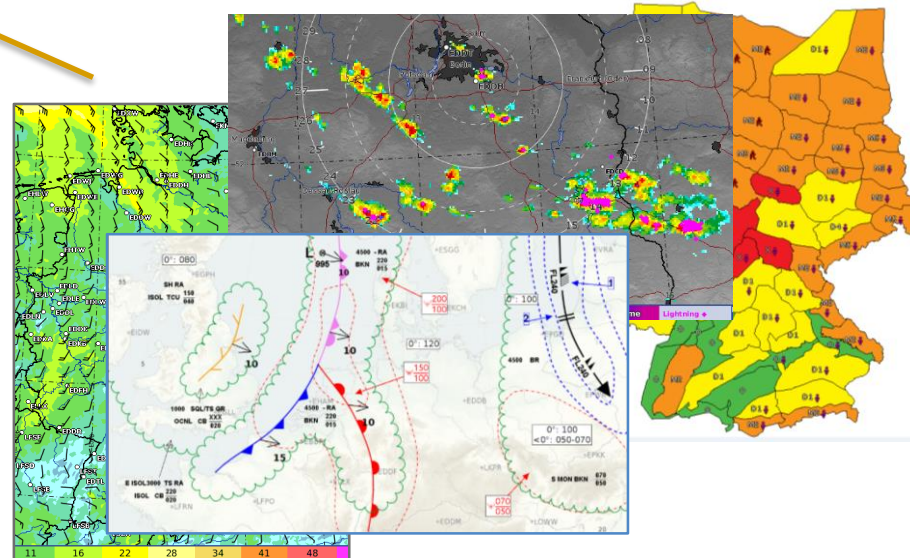
New Information Service

Flight preparation – Data pre-loading

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GAFOR Deutschland vom 09.12.2017, 10:55 UTC
12:00 - 14:00 UTC

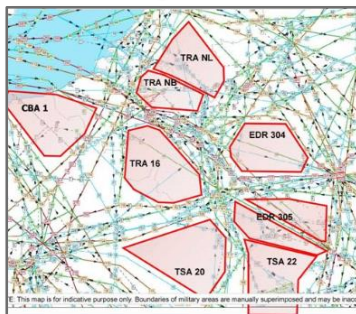


RWY RUNWAY 03/21 WIP SN REMOVAL. 24 JAN 14:05 2016
UNTIL 24 JAN 19:00 2016. CREATED: 24 JAN 14:05 2016

Effective Jan 24, 2016 9:05 AM EST
Expires Jan 24, 2016 2:00 PM EST
Updated Jan 24, 2016 9:05 AM EST

RWY RUNWAY 03/21 FICON ICE BA POOR OBSERVED AT
1601241330. 24 JAN 14:05 2016 UNTIL 24 JAN 19:00
2016. CREATED: 24 JAN 14:05 2016

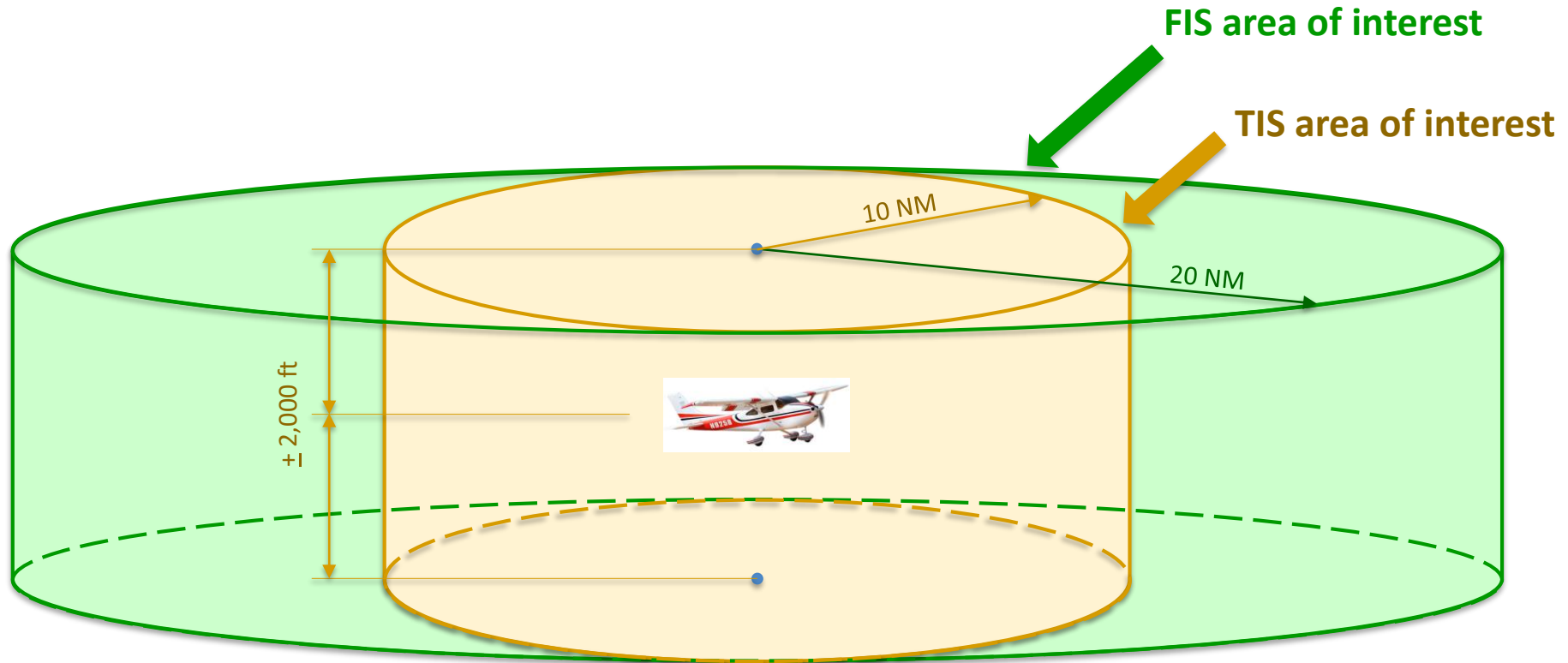
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PJ14-02-05 Methodology (5)

New Information Service

FIS/TIS areas of interest

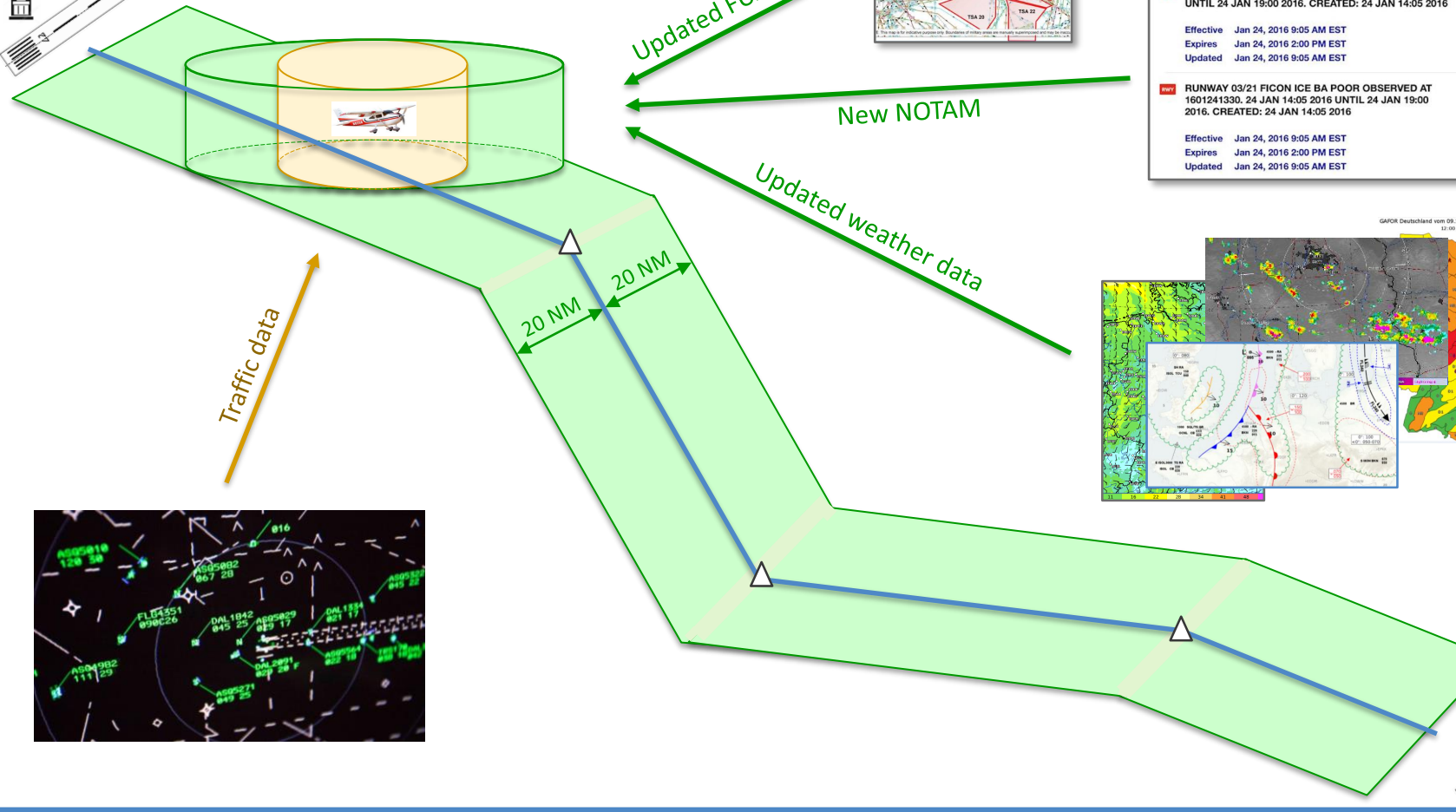
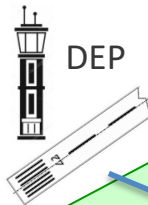


PJ14-02-05 Methodology (6)

New Information Service

Flight execution – uploading of actual data

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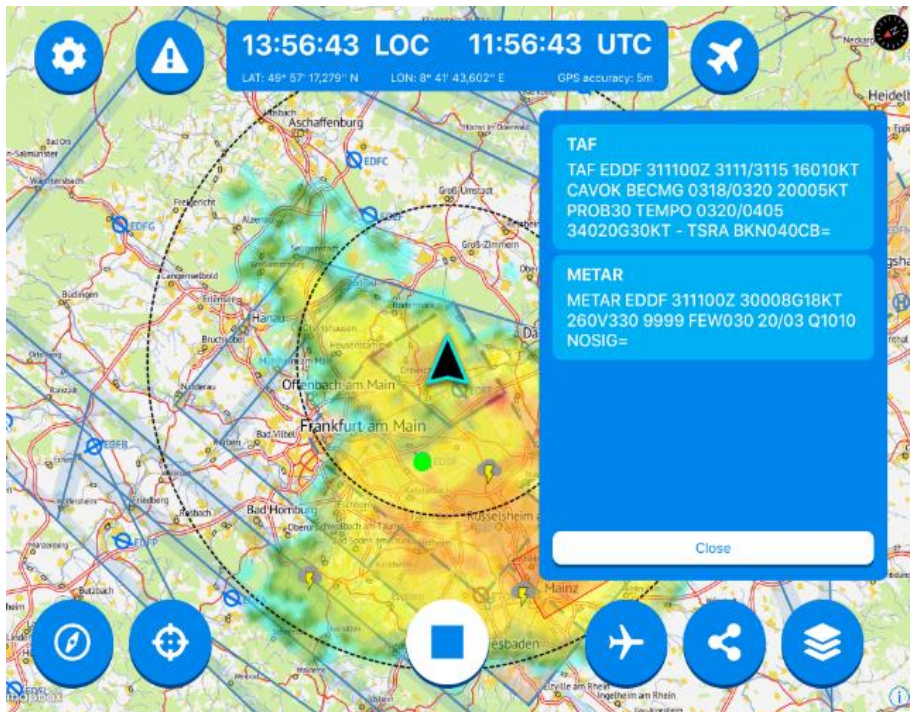


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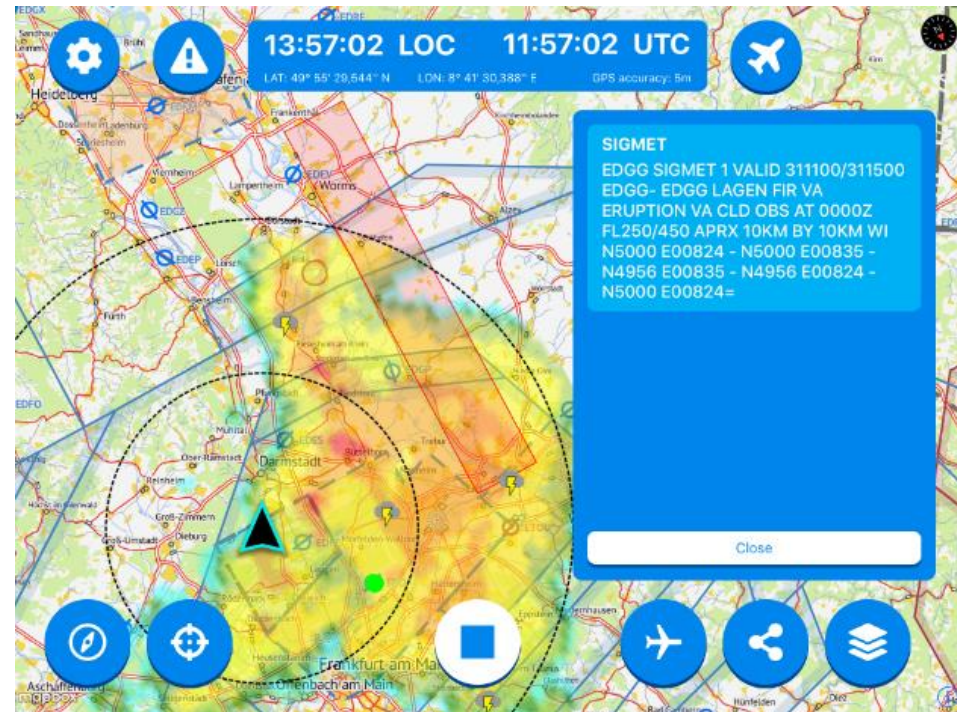
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PJ14-02-05 Results (1)

New App (and GDPU) fully developed and validated
(V2 Validation Exercises with performed GA pilots)



METAR, TAF, precipitation data



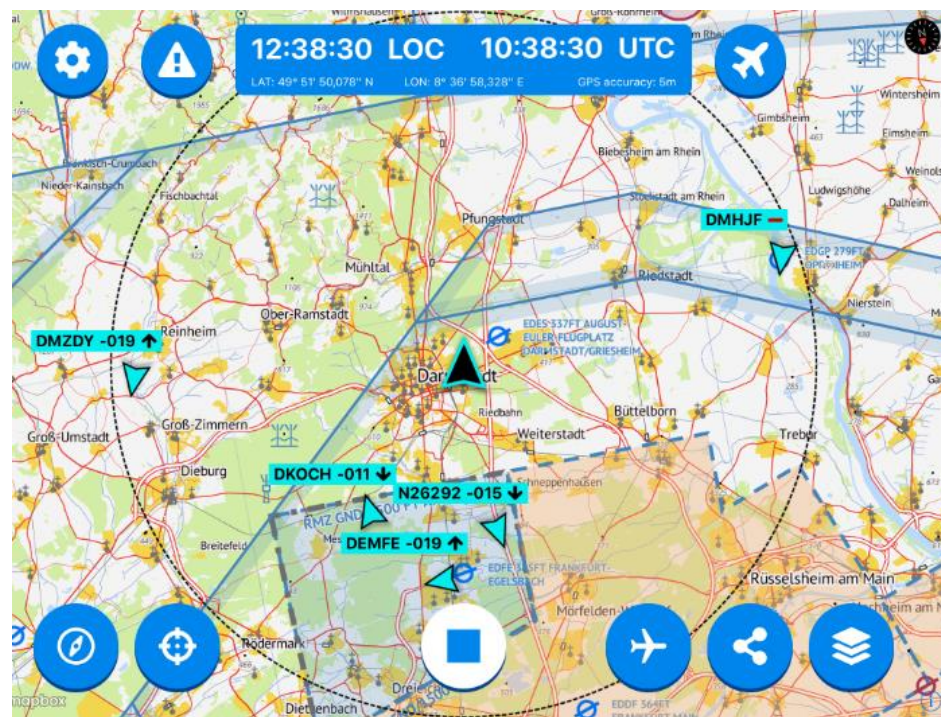
SIGMET, precipitation data

PJ14-02-05 Results (2)

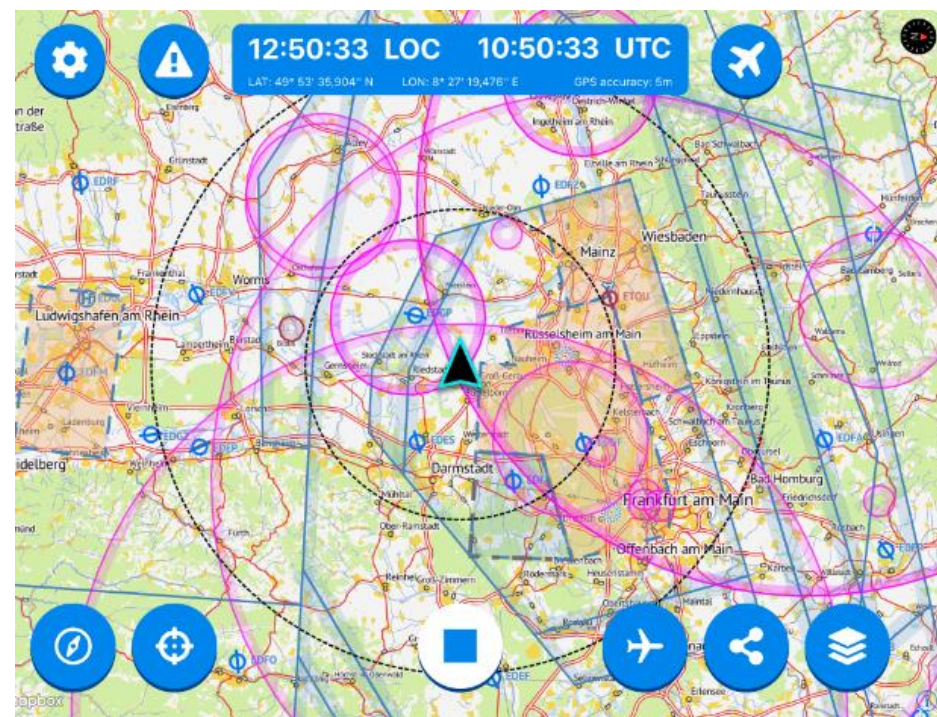
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New App (and GDSU) fully developed and validated
(V2 Validation Exercises with performed GA pilots)



Traffic data



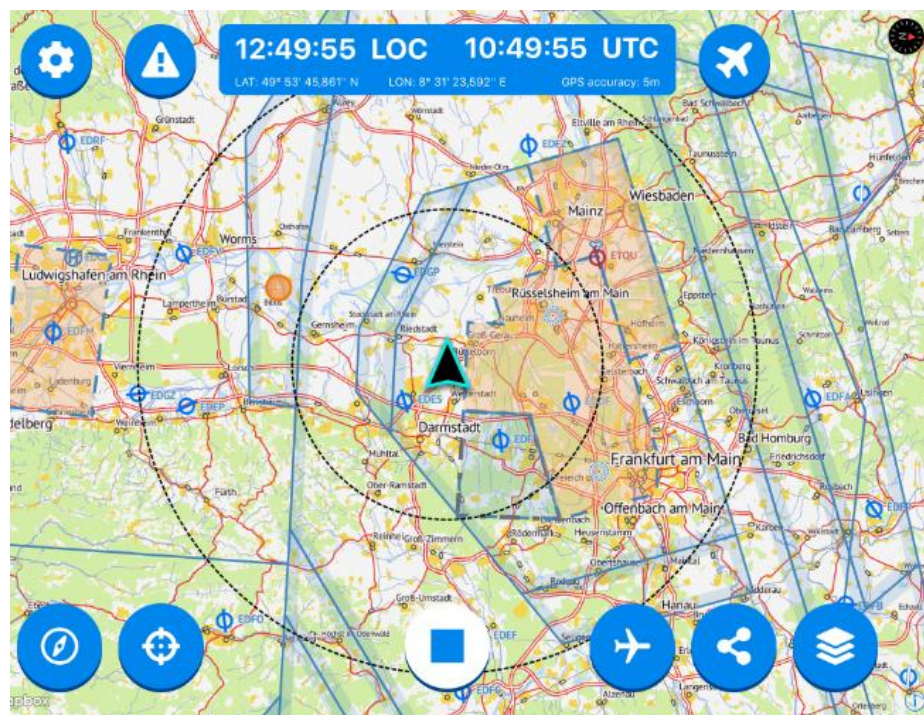
NOTAM (with validation areas)

PJ14-02-05 Results (3)

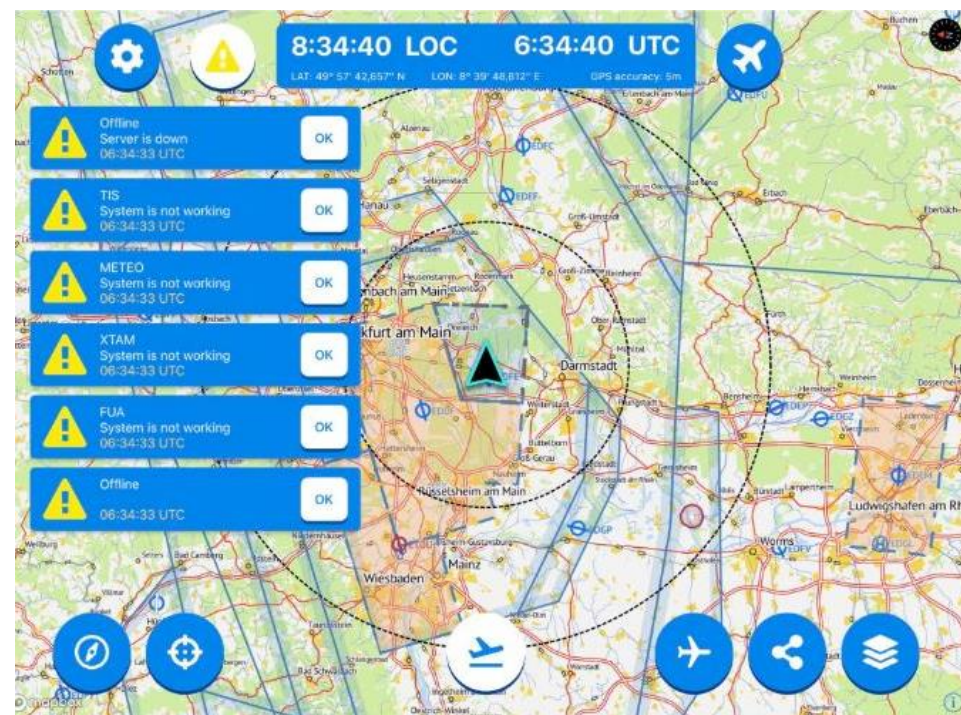
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New App (and GDPU) fully developed and validated
(V2 Validation Exercises with performed GA pilots)



FUA restricted depiction



Data loss notifications

PJ14-02-05 Next steps

Flight trials in a follow-up project

**Proof of Concept for transmission and App,
using the extended mobile network and GA aircraft**

Test Scenarios



4



Flight tests in 1,000- to 10,000 ft altitude: Dedicated test network with up-tilted antennas



3



Flight tests in 1,000-10,000 ft altitude, area with measured coverage in existing network

2



Flight tests close to ground (1,000 to 1,500 ft AGL)

1



Road tests with cars (PJ14-02-05 in 2019)

Mobile cellular network

Extended Network
(HW investment in sites / antennas)

Existing Network
(no HW investment; support regarding coverage analysis)

PJ14-02-05 Conclusions



- Proposed new in-flight FIS/TIS data service capable to increase safety for General Aviation pilots
- Promising potential as an additional information means on-board of GA aircraft
- An extended LTE based mobile cellular network covering GA altitudes up to 10,000 ft. MSL as a key factor for the success of this Information Service
- New in-flight FIS/TIS Information Service particularly advantageous in case of possible implementation all over Europe
- No continuation in SESAR2020 Wave 2
- Safety Assessment to be refined in an iterative process together with GA pilots
- CBA input data and assumptions to be validated



PJ14-02-05 – FIS/TIS data for General Aviation

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Thank you very much for your attention!



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